

Prairie Special 1500-3000L Operator's Manual MY17



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GOLDACRES - RESELLER TERMS AND CONDITIONS OF SALE

Goldacres Goods are only available for purchase upon the terms and conditions set out below.

Interpretation

- In terms and conditions:
 - "Goldacres" means Goldacres Trading Pty Ltd A.C.N.061 306 732 trading as Goldacres Agricultural Equipment (its successors and assigns) which is the seller of the Goods;
 - "Purchaser" means the purchaser of the Goods;
 - "Goods" means the products and, if any, the services sold or provided by Goldacres to the Purchaser;
 - "GST Act" and "GST" are given the meanings referred to in a New Tax System (Goods and Services Tax) Act 1999.
 - "PPSA" means the Personal Property Securities Act 2009 (Cth) (as amended);
 - Nothing in these terms and conditions shall be read or applied so as to exclude, restrict or modify or have the effect of excluding, restricting or modifying any condition, warranty, guarantee, right or remedy implied by law (including the Competition and Consumer Act 2010) and which by law cannot be excluded, restricted or modified.

General

- (1) The Goods and all other products or services provided by Goldacres are provided subject to these terms and conditions. These terms and conditions and any terms and conditions incorporated herein by virtue of clause 3 hereto shall prevail over all other terms and conditions of the Purchaser or otherwise to the extent of any inconsistency.
- These terms and conditions may not be modified or amended without the expressed written consent of Goldacres endorsed by the Managing Director of Goldacres Trading P/L.

Additional Terms and Conditions

- From time to time Goldacres may provide additional or extended warranties in respect of certain goods and/or services. Where such additional or extended warranties are provided to a Purchaser in writing they will be incorporated into these terms and conditions provided that in the event of any inconsistency between these terms and conditions and the terms of any additional or extended warranty, the provisions of the additional or extended warranty shall prevail.

Goldacres quotations.

- Unless previously withdrawn, Goldacres quotations are open for acceptance within the period stated therein or, when no period is stated, with 14 days only of the quotation date. Goldacres reserves the right to refuse any order based on any quotation within 7 days of receipt of the order.

Packing

- The cost of any special packing and packing materials used in relation to the Goods shall be at the Purchaser's expense notwithstanding that such cost may have been omitted from any quotation.

Shortage

- The Purchaser waives any claim for shortage of any Goods delivered if a claim in respect thereof has not been lodged with Goldacres within (7) seven days from the date of receipt of the Goods by the Purchaser.

Specifications, etc: Catalogues, etc: Quantities

- All specifications, (including but not limited to: drawings, particulars of weights, volumes, capacities, dimensions, load factors) are approximate only and any deviation shall not be taken to vitiate any contract with Goldacres or form any claim against Goldacres. The descriptions, illustrations, and performances contained in catalogues, price lists and other advertising matter do not form part of the contract of sale of the Goods. Where specifications, drawings or other particulars are supplied by the Purchaser, Goldacres' price is made on estimates of quantities required. Should there be any adjustments in quantities above or below the quantities estimated by Goldacres and set out in a quotation, then any such increase or decrease shall be adjusted on a unit rate basis according to unit prices set out in the quotation.

Performance, Capacities, Chemicals, Liquids, Application Methods, Environmental Effects

- Any performance, volumes, and/or capacity figures given by Goldacres are estimates only. Goldacres shall be under no liability for damages for failure to obtain such figures unless specifically guaranteed in writing and any such written guarantee shall be subject to the recognised tolerances applicable to such figures. The suitability of chemicals and other liquids for any application and the application methods and the environmental effects shall be the sole decision and responsibility of the Purchaser and the user of the Goods. Goldacres gives no warranty as to the suitability of any chemicals or other liquids for any application, nor the application methods nor the environmental effects, which may result from the use of the Goods. Goldacres shall be under no liability for damages arising out of the use of any chemicals, liquids, or mixtures in the Goods nor for any application, nor for the application methods nor for the environmental effects, which may result from the use of the Goods.

Delivery/Service Times

- The delivery times and service times made known to the Purchaser are estimates only and Goldacres shall not be liable for late delivery, non-delivery or delay and under no circumstances shall Goldacres be liable for any loss, damage or delay occasioned by the Purchaser or its customers arising from the late or non-delivery or late installation of the Goods.

Loss or damage in transit

- Goldacres is not responsible for any loss or damage to Goods in transit. Goldacres shall render the Purchaser such assistance as may be necessary to press claims on carriers provided that the Purchaser shall have notified Goldacres and the carriers immediately the loss or damage is discovered on receipt of Goods and shall lodge a claim on the carrier within three days of the date of receipt of the Goods. Insurance of Goods in transit is the responsibility of the Purchaser.

Limit of Liability

- (1) Goldacres liability for Goods manufactured by it is limited to:
 - where the law implies consumer guarantees into these terms and conditions pursuant to Part 3.2 Division 1 of Schedule 2 to the Competition and Consumer Act 2010 (Cth) ("consumer guarantees") which cannot be excluded and Goldacres breaches a consumer guarantee, the loss and damage the Purchaser is entitled to at law which cannot be excluded by these terms and conditions;
- and, in all other cases:
 - making good any defects by repairing the same or at Goldacres option by replacement within a period not exceeding either 1000 hours or twelve calendar months, whichever comes first, after the Goods have been dispatched provided that:
 - the defects have arisen solely from faulty materials or workmanship;
 - the Goods have not received maltreatment, inattention or interference;
 - accessories of any kind used by the Purchaser are manufactured or approved by Goldacres;
 - where applicable, the seals on the Goods remain unbroken;
 - there has been no improper adjustment, calibration or operation;
 - the use of accessories including consumables, hardware or software (not manufactured by Goldacres) has been approved in writing by Goldacres;
 - no contamination or leakage has been caused or induced;
 - any modification to the Goods have been authorised in writing by Goldacres;
 - there has been no inadequate or incorrect use, storage, handling or application of the Goods;
 - there has been no use or operation of the Goods outside of the physical, electrical or environmental specifications of the Goods;
 - there has been no inadequate or incorrect site preparations;
 - there has been no inadequate or improper maintenance of the Goods;
 - it has not been caused by fair wear and tear; and
 - firstly the Goods have been thoroughly inspected and any damage (from whatever cause) to the Goods (and in particular – the structure, welding, seams, bolts, booms) has been repaired prior to the Goods being operated, used driven or moved and on each occasion the tanks are filled; and
 - there has been no failure to comply with the requirements of all present or future laws or regulations relating to the Goods and/or the use and/or the operation of the Goods; and
 - there has been no failure to maintain a record of hours of operation (which record shall contain full details of all inspections, repairs and maintenance) and produce same to Goldacres at the time of the claim;
 - the defective Goods or any damaged part of the Goods are promptly returned free of cost to Goldacres or a representative of Goldacres;
- all warranty related repairs have been carried out with the prior authorisation of Goldacres;
- If Goods or any part thereof are not manufactured by Goldacres, in particular engines, engine accessories, transmissions, transfer cases, differentials, tyres, tubes, batteries, radios and UHF's, the guarantee of the manufacturer thereof shall be accepted by the Purchaser and is the only guarantee given to the Purchaser in respect of the Goods or that part provided always that this clause does not seek to exclude the consumer guarantees;
- In the case of hydraulic systems, Goldacres shall replace defective parts in accordance with clause 11(I) of these conditions, provided that the failure of the part was not related to contamination within the system. Goldacres shall not be liable for labour in the case of repairing hydraulic system defects;
- Goldacres will not accept liability for damage attributed to fair wear and tear including but not limited to fair wear and tear to nozzles, chains, belts, filters, brake pads, polyethylene bushes and liquid pump valves, valve O-rings, diaphragms and seals;
- Goldacres shall not be liable for and the Purchaser releases Goldacres from any claims in respect of faulty or defective design of any Goods supplied unless such a design has been wholly prepared by Goldacres and the responsibility for any claim has been specifically accepted by Goldacres in writing and in any event Goldacres liability hereunder shall be strictly limited to the replacement of defective parts in accordance with paragraph 11(I) of these conditions provided always that this clause does not seek to exclude the consumer guarantees;
- Except as provided herein, all express and implied warranties, guarantees and conditions under statute or general law as to the merchantability, description, quality, suitability or fitness of the Goods for any purpose or as to design, assembly, installation, materials or workmanship or otherwise are hereby expressly excluded and Goldacres shall not be liable for physical or financial injury, loss or damage or for consequential loss or damage of any kind arising out of the supply, layout, assembly, installation or operation of the Goods or arising out of Goldacres negligence or in any other way whatsoever;
- The benefit of any warranty provided under these terms and conditions shall only be available to the Purchaser and shall not be transferable by the Purchaser;
- The warranties provided under these terms and conditions do not extend to second hand or used Goods that may be sold by Goldacres.
- Goldacres liability for breach of a consumer guarantee is hereby limited (in the case of goods and services not used for personal, domestic or household purposes) to:
 - in the case of Goods, any one or more of the following:
 - the replacement of the Goods or the supply of equivalent Goods;
 - the repair of the Goods;
 - the payment of the cost of replacing the Goods or acquiring the equivalent Goods;
 - the payment of having the Goods repaired; or
 - in the case of services;
 - the supplying of the services again; or
 - the payment of the cost of having the services supplied again.

Prices

- (1) Unless otherwise stated in writing by Goldacres, all prices quoted by Goldacres are inclusive of GST for supplies within Australia and exclusive of GST for exports outside of Australia. Prices quoted are those ruling at the time of quotation or the date the price is given and are based on rates of freight, insurance, customs, duties, taxes, exchange, shipping expenses, sorting and stacking charges, cartage, cost of materials and other charges affecting the cost of production ruling on that date and any alterations thereto either before acceptance of or during currency of the contract shall be to the Purchaser's account.
- For the purpose of 38-185 of the GST Act, the day upon which the seller gives the invoice for the supply shall be the date of the invoice.

Payment

- (1) The purchase price in relation to the Goods and the cost of the service shall be payable without deduction and or set off and payment thereof shall be made on or before the thirtieth day of the month following the delivery of the Goods or performance of the

services unless other terms of payment are expressly stated in writing.

- A decreasing or increasing adjustment and or the issuing of an adjustment note, pursuant to Division 21 and Division 29-C of the GST Act, shall not, in any way, constitute a release, waiver, or for forgiveness of the debt incurred by the Purchaser.

Interest on overdue payments

- If Goldacres is not paid for any Goods or services on the due date specified in this agreement without prejudice to any other right or remedy, all outstanding money shall bear interest at the rate set, pursuant to the Penalty Interest Rates Act, Victoria, 1986, as such money, together with interest shall be recoverable forthwith from the Purchaser.

Rights in relation to Goods.

- (1) Title to the Goods supplied by Goldacres to the Purchaser shall remain with Goldacres until the total amount due in respect of the Goods and all monies owing to Goldacres have been paid in full (the "Debts"). Risk in the Goods shall pass to the Purchaser upon delivery.
- The Purchaser shall have the right to resell Goods but only as fiduciary agent and trustee for Goldacres by way of bona fide sale at full market value and in the ordinary course of its business.
- Until all the Debts have been paid in full:
 - the Purchaser shall take custody of the Goods as trustee, fiduciary agent and bailee for Goldacres;
 - the Purchaser shall keep the Goods separate from any other goods and properly marked, stored, protected and insured;
 - the Purchaser must hold all of the money it receives ("Proceeds"):
 - from the sale of any property into which Goods supplied have been incorporated; and
 - from the sale of Goods or provision of services including the Goods supplied by the Goldacres as bailee, fiduciary agent and trustee for Goldacres, but the Purchaser need not hold on trust any money exceeding the amount of the Debts at the time the money is received.
 - The Purchaser expressly acknowledges that it is bound by the fiduciary obligation created in the preceding paragraph and acknowledges that:
 - it must hold the Proceeds on trust for Goldacres;
 - it must place the whole of the Proceeds in an account separate from its own moneys (the "Proceeds Account");
 - it must maintain the Proceeds Account separate from its own moneys at all times.
 - it must maintain proper records for the Proceeds Account.
 - it must not assign or encumber any book debts arising from sales made in circumstances set out in clauses 16(c)(i) and (ii) or do any other act in derogation of Goldacres' legal or beneficial interests; and
 - it must account to Goldacres on demand for all moneys standing to the credit of such account.
 - For the purposes of identification of different consignments of Goods purchased from Goldacres and receipt of Proceeds, the Purchaser agrees that the principle of "Last In, First Out" shall be applied to any items that cannot be distinguished.
 - Goldacres may trace the Proceeds in equity.
 - Goldacres may at any time, without notice to the Purchaser and without prejudice to any other rights which it may have against the Purchaser, terminate any contract connected with the Goods and the bailment referred to in clause 16(3) and enter upon any premises owned or occupied by the Purchaser where Goldacres reasonably believes the Goods may be stored, and repossess the Goods without liability for any damaged caused, and subsequently dispose of the Goods at Goldacres' discretion if:
 - the Debts are not paid in accordance with these terms and conditions or any other contract or arrangement between Goldacres and the Purchaser; or
 - Goldacres receives notice of or reasonably believes that:
 - a third person may attempt to levy execution against the Goods; or
 - the Purchaser is insolvent (within the meaning of the Corporations Act 2001) or bankrupt; or
 - the Purchaser has entered into an arrangement or composition with its creditors, gone into liquidation, or has appointed a receiver, a receiver and manager or administrator.
 - If after repossession under clause 16(4) Goldacres sells the Goods, Goldacres shall account to the Purchaser for any proceeds of sale (less expenses of repossession and sale) that exceeds the amount of the outstanding Debts.
 - If any Goods belonging to Goldacres are disposed of by the Purchaser or an insurance claim is made in respect of them, Goldacres shall be entitled to trace the sale or insurance proceeds, which proceeds shall be held by the Purchaser in a separate bank account on trust for Goldacres.
 - The Purchaser agrees and acknowledges that in the event it sells Goods to a third party on account, it will include in its terms and conditions of sale a provision under which the Purchaser retains title to the Goods until such time that the total amount due in respect of the Goods and all monies owing to the Purchaser have been paid in full by that third party debtor. The Purchaser also agrees and acknowledges that in these instances, it will register its PMSI in accordance with the PPSA in respect of its security interest in the Goods.

PPSA provisions

- (1) The Purchaser acknowledges that these terms and conditions constitute a security agreement for the purposes of section 20 of the PPSA and that a security interest exists in all Goods (and any associated Proceeds from their sale) previously supplied by Goldacres to the Purchaser (if any) and in all in future Goods (and any associated Proceeds from their sale) that may be supplied to the Purchaser by Goldacres.
- The Purchaser acknowledges that Goldacres has a first ranking purchase money security interest ("PMSI") (as defined in section 14 of the PPSA) in the Goods and the Purchaser must not jeopardise such ranking (whether by act or omission).
- The Purchaser acknowledges that it has received value as at the date of first delivery of the Goods and has not agreed to postpone the time for attachment of the security interest (as defined in the PPSA) granted to Goldacres under these terms and conditions.
- The Purchaser will execute documents and do such further acts as may be required by Goldacres to register the security interest granted to Goldacres under these terms and conditions under the PPSA.
- Until ownership of the Goods passes, the Purchaser must not give to Goldacres a written demand or allow any other person to give Goldacres a written demand requiring Goldacres to register a financing charge statement under the PPSA in respect of Goldacres' interest in the Goods.
- The Purchaser must indemnify Goldacres and on demand reimburse Goldacres for all costs and expenses incurred by Goldacres in respect of these terms and conditions including but not limited to Goldacres registering its security interest in the Goods, lodging, discharging or amending any financing statement or financing change statement, or otherwise complying with the PPSA.
- The Purchaser agrees (other than as provided in these terms and conditions) not to sell, lease, mortgage, deal with, dispose of or create or attempt to create any other security interest in or affecting the Goods unless and until the Purchaser's Debts have been satisfied.
- The Purchaser waives its rights under the following provisions of Chapter 4 of the PPSA:
 - to receive a notice on enforcement action against liquid assets (section 121(4));
 - to receive a notice to seize collateral (section 123);
 - to receive a notice of disposal of Goods by Goldacres purchasing the Goods (section 129);
 - to receive a notice to dispose of Goods (section 130);
 - to receive a statement of account following disposal of Goods (section 132(2));
 - to receive a statement of account if no disposal of Goods for each 6 month period (section 132(4));
 - to receive notice of any proposal of Goldacres to retain Goods (section 135(2));
 - to object to any proposal of Goldacres to either retain or dispose of Goods (section 137(2));
 - to redeem the Goods (section 142);
 - to reinstate the security agreement (section 143);
 - to receive a notice of any verification statement (section 157(1) and section 157(3));
- The rights Goldacres may have under the PPSA are supplementary and in addition to those set out in these terms and conditions and do not derogate from the rights and remedies of Goldacres under these terms and conditions or under any other statute or under general law.
- The Purchaser must give 10 business days prior written notice of any proposed change in the Purchaser's name or other identifying characteristics and details.

Purchasers property

- Any property of the Purchaser under Goldacres' custody or control shall be entirely at the Purchaser's risk as regards loss or damage caused to the property or by it.

Storage

- Goldacres reserves the right to make a reasonable charge for storage if delivery instructions are not provided by the Purchaser within (14) fourteen days of a request by Goldacres for such information.

Returned Goods

- Goldacres shall not be under any obligation to accept Goods returned by the Purchaser and will do so only on terms to be agreed in writing in each individual case.

Goods sold

- All Goods to be supplied by Goldacres shall be described on the purchase order agreed by Goldacres and the Purchaser and the description on such purchase order modified as so agreed shall prevail over other descriptions including any Purchaser's specification or enquiry.

Cancellation

- No order may be cancelled except with the consent in writing and on terms, which will indemnify Goldacres against all losses.

No waiver

- The failure of any party to enforce the provisions of these terms and conditions or to exercise any rights expressed in these terms and conditions shall not be a waiver of such provisions or rights and shall not affect the enforcement of this agreement. The exercise by any party of any of its rights expressed in this agreement shall not preclude or prejudice such party from exercising the same or any other rights it may have irrespective of any previous action taken by that party.

Force Majeure

- If by reason of any fact, circumstance, matter or thing beyond the reasonable control of Goldacres is unable to perform in whole or in part any obligation under these terms and conditions then Goldacres shall be relieved of that obligation under these terms and conditions to the extent and for the period that it is so unable to perform and shall not be liable to the Purchaser in respect of such inability.

Passing of risk

- Risk in the Goods shall pass to the Purchaser upon delivery of the Goods to the Purchaser or collection of the Goods by the Purchaser's agent or carrier as the case may be.

Exclusion of liability

- To the extent permitted by law Goldacres shall not be liable to the Purchaser in contract or in tort arising out of, or in connection with, or relating to, the performance of the Goods or any breach of these conditions or any fact, matter or thing relating to the Goods or error (whether or not it is negligent or a breach of contract) in information supplied to the Purchaser or a user before or after the date of the Purchaser's or user's use of the Goods and Goldacres shall be under no liability for damages arising out of the use of any chemicals, liquids, or mixtures in the Goods, nor for any application, nor for the application methods nor for the environmental effects, which may result therefrom or from the use of the Goods.

Exclusion of representations and arrangements

- To the extent permitted by law the terms and conditions supersede and exclude all prior and other discussions, representations (contractual or otherwise) and arrangements relating to the supply of the Goods or any part thereof including, but without limiting the generality of the foregoing, those relating to the performance of the Goods or any part thereof or the results that ought to be expected from using the Goods.

Place of contract

- The contract for sale of the Goods and the provision of the services is made in the State of Victoria and the Purchaser agrees to submit all disputes arising with Goldacres to the courts of such State and any court competent to hear appeals therefrom.

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Chapter I

INTRODUCTION

Welcome

Congratulations on your purchase of a Goldacres sprayer. For more than a quarter of a century Goldacres has supplied Australian farmers with quality, innovative and technologically advanced spraying solutions - equipment designed in Australia for Australian conditions.

Goldacres not only produce Australia's finest range of spraying equipment - we also keenly value the unique relationship we enjoy with owners of our equipment. We are pleased to welcome you as a Goldacres owner and look forward to making your spray applications as efficient as possible.

Please use this comprehensive resource to gain a full understanding of your equipment, and don't hesitate to contact your Goldacres Dealer or Goldacres for further information.



Roger Richards
General Manager
Goldacres

Chapter 2

SAFETY

Safety Information

General

The following pages outline important safety information. At Goldacres safety is a high priority. These safety and warning instructions **MUST** be followed to ensure the safe operation of your Goldacres equipment.

Explanation of key terms used in this operator's manual are:

DANGER - You will be killed or seriously hurt if you don't follow instructions

WARNING - You can be seriously hurt if you don't follow instructions

CAUTION - You can be hurt if you don't follow instructions

NOTE - Is used to notify people of installation, operation or maintenance information that is important but not hazard related.

The Operator

All operators of this equipment should be adequately trained in the safe operation of this equipment. It is important that all operators have read and fully understand the operator's manual prior to using this equipment.

All new operators should be trained in an area without bystanders or obstructions and become familiar with the sprayer prior to operation.

Passengers

Do not stand on or carry passengers on the steps or platform when the sprayer is in motion or when the booms are being folded or unfolded.

Warnings

- Always read and understand the operator's manual prior to operation of this equipment.
- It is the responsibility of the operator to ensure that there are no damaged or missing decals on the equipment and that any damaged or missing decals are replaced prior to operation.
- Goldacres equipment either ordered or operated outside the guideline limitations may not be warranted by Goldacres for successful performance. Operators working outside these limitations do so at their own risk, unless specific

advice has been sought from, and provided by, Goldacres in writing.

- Inspect the equipment thoroughly for damage and wear before operation.
- Always read and follow the chemical manufacturer's guidelines for safe application as per the chemical label. Particular attention should be given to the recommended target application rate of the chemical being applied as per the chemical label.
- Goldacres equipment uses several materials that may be harmful to the environment. Potentially harmful waste used with Goldacres equipment includes such items as oil, fuel, coolant and batteries. If these items are disposed of incorrectly the waste can threaten the surrounding environment and ecology. The waste products can leech into surrounding water sources and contaminate the area.
- Certain chemicals may be unsuitable for use with Goldacres standard plumbing designs. Consult your Goldacres dealer if in doubt.
- Do not operate the equipment while under the influence of any drugs, alcohol or if excessively tired.
- Lubricate the equipment as per recommended requirements before operating.
- Make sure that the equipment complies with all relevant road regulations when transporting.
- Flush chemicals from equipment immediately after use.
- When draining fluids from the equipment use appropriate, leak proof containers. Do not use food or beverage containers because someone may consume the contents by mistake.
- Any unauthorised modifications to this equipment may affect its function and create a serious safety risk.
- Keep clear of overhead obstructions – especially power lines as contact can be fatal.
- Never attempt to clean parts, or nozzles, by blowing with mouth.

Continued over page

Safety Information

- Never attempt to siphon chemicals, or substances, by sucking.
- It is imperative that the tow vehicle manufacturer's specifications be checked and all instructions for use when transporting, or towing, be adhered to at all times.
- Care should be taken when transferring liquid into the tank to ensure that the gross weight of the trailer does not exceed the braking and carrying capacity as specified by the tow vehicle manufacturer.

NOTE: 1 Litre water = 1 Kg.

- Water weighs 1kg per litre, however conversion factors must be used when spraying liquids that are heavier or lighter than water. Example: liquid nitrogen has a density of 1.28 kg/L and will therefore be significantly heavier than water if the tank is filled completely. The total weight of a tank full of chemical, should not exceed that of a full tank of water. Machine damage can result if the machine is over weight. See filling instructions in Chapter 8 'Operation' for more information.
- Consideration should be given to both the carrying capacity of the trailer and the gradient of the terrain when determining the speed at which the tow vehicle can be driven safely.
- Ensure equipment is securely fastened or attached to machine at all times.
- Never stand within the radius of the boom wings.
- Never work under any hydraulically raised boom.

Cautions

- A supply of fresh water should be with the equipment at all times.
- Water tanks are not designed for use with diesel fuel or any flammable liquid.
- Do not use this machine in ambient temperatures exceeding 40 degrees Celsius.
- Ensure that all bolts are tightened and secured before operation.
- Always ensure that the boom is securely supported when travelling.
- Where fitted, care should be taken to never overfill the diaphragm pump with oil or operate at speeds exceeding 540 rpm.
- Do not exceed the maximum spraying pressure of 8 Bar.

Dangers

- Check area to be sprayed for overhead powerlines. Contact between the machine and powerlines

can result in serious injury or death. If there are powerlines in the spray area, exercise extreme caution when tilting boom wings.

- Do NOT walk on machine platform when near power lines.

Personal Protective Equipment (PPE)

Always wear close fitting clothing and appropriate safety equipment designed for the job at hand.

- Exposure to loud noise over an extended period can cause permanent hearing impairment or loss. Be active in the conservation of your hearing and wear appropriate hearing protection at all times.
- Chemicals can be harmful to humans, appropriate PPE should be used when handling chemicals.

CAUTION: Always refer to the chemical manufacturers label for guidelines on the appropriate PPE to use with the chemical/s you are using.

Goldacres also suggests that you read and understand the following Australian standards:

- Australian Standard for Chemical protective clothing AS3765.
- Australian Standard for Respiratory protection devices AS1715.

Poisons Information Centres - Call 131 126 (AU)

Cuts, Stabs & Punctures

When Servicing machine, be mindful of sharp edges on parts such as trimmed cable ties, hose clamps, cut reinforced hose and the edges of plates and brackets as they could cause cut, stab or puncture injuries.

Crush Hazard

Never attempt to maintain axles, wheels or components within the vicinity of the wheels with the tow vehicle running or in motion.

Pinch Hazard

When operating moving components such as the boom, access ladder or other components, keep fingers and hands away from potential pinch points.

Burn Hazard

- Avoid contact around all hydraulic lines when at operating temperature

Entanglement Hazard

Rotating drives can cause serious injury or even death when entanglement occurs. Keep hands, feet, hair and clothing away from all moving parts to prevent injury. Never operate this machine with covers, shrouds, or guards removed.

Continued over page

Safety Information

Stored Energy Hazard

Even when the machine is not operating, energy can be stored in components such as hydraulic accumulators, air tanks, tyres, hoses, springs and boom cables. Hydraulically supported components such as the boom center are also a source of stored energy. Before working on the machine, ensure that these parts are relieved of their energy in a safe manner.

Overhead Hazard

BOOM LIFT OR TILT COULD STRIKE POWER LINES. Keep clear of overhead obstructions – especially power lines as contact can be fatal. Do NOT walk on machine platform when near power lines.

Airborne Particles

- Always stand well clear of equipment during operation.
- Any spray drift is dangerous and may be hazardous to humans and other animals.
- When heating and welding components, ensure that all paint and other such materials are removed. Often hazardous airborne particles and fumes are generated from welding and heating.

Fluids Under Pressure

Fluids escaping from high pressure lines can cause serious injury to skin. Hydraulic oil can easily penetrate human skin. This hazard can be avoided by relieving the pressure in the system.

Do not disconnect any hoses, nozzles or filters while equipment is operating. Disconnecting these components while under pressure may result in uncontrolled fluid discharge which may be hazardous.

Be mindful of the location of pressurised lines in the vicinity of the work area when using equipment such as grinders, oxy torches and welders. The two main risks are that this equipment may easily cut through the lines or the local heat generated near the lines may cause them to rupture.

Ensure that all fittings and lines are fully/tightly secured before re-pressurizing after repairs.

Norac System

If Norac height control system is fitted, keep clear of the boom as it could potentially move without notice.

Lifting Machine

Before raising the machine off the ground:

- ✓ Ensure that the boom is in its closed position.
- ✓ Park up on a flat, level and firm area.

- ✓ Empty the spray tank where possible.
- ✓ Chock all wheels that remain on the ground.
- ✓ Securely lift the machine using a jack and support the machine on work stands.
- ✗ Do not work under the machine when supported solely by a jack.
- ✗ Do not support the sprayer using materials that may crumble.

Changing Wheels & Tyres

An experienced person with the correct equipment should mount the wheels on the sprayer.

When changing a wheel on the sprayer ensure that the sprayer is on firm level ground and the wheels are chocked.

Tyre Maintenance

Maintain correct tyre pressure at all times. Inflation of tyres above or below the recommended pressure exerts additional pressure on the tyre, which may result in tyre damage.

Extreme caution is required during the inflation of tyres. If the tyre is inflated at a rapid rate separation and/or explosion of the rim can occur. This event can inflict serious or fatal injuries to the operator.

- ✓ Always use a tyre inflation gauge.
- ✓ Be proactive and continually check the condition of your tyres.
- ✗ Do not weld, heat or modify the rim.

Machine Operation

- High speed turning places severe stresses on the wheels and axles and should be avoided. It is essential to observe the effects of turning on the open spray boom. Excessive turning speeds transmit great stresses to the spray boom and WILL CAUSE boom damage.
- This machine is designed for a maximum speed of 50 km/h. This speed must only be used on suitable terrain conditions. All components i.e. tyres, brakes, suspension, steering and chassis are designed and built to this maximum speed.
- MAXIMUM SPEED WHEN CORNERING, TURNING AT AN ANGLE GREATER THAN 45° OR DRIVING ON A SLOPE OR UNEVEN TERRAIN IS 5KM/H. When fitted with narrow wheel track and with high centre of gravity, the sprayer may become unstable when turning at excessive speed or when operating on excessively steep terrain.

Continued over page

Safety Information

Collision Prevention & Warning Lights

- Before operating the machine check with the relevant road management authorities for information regarding safe and legal transport on public roads in the state where the machine is being operated.
- To assist in the prevention of collisions with other road users the Goldacres sprayers are fitted with warning lights and signs in accordance with national road regulations.
- The machine can only be taken on public roads during daylight hours.
- Keep lighting and signs in good order and replace any damaged or faulty fixtures.

Regularly review safety decals with operators. It is very important to ensure that all new machine components and replacement parts include current hazard identification decals.

Replacement safety decals can be ordered from your Goldacres dealer. Part numbers and descriptions of the decals on this machine can be found in the parts manual supplied.

Working at Heights

Please contact your local government on the restrictions and safety requirements needed to operate at heights.

- There is a risk a falling if a person has "climbed" onto the machine.
- Do not "climb" on machine to get access.
- Use ladder or work platform to get access to parts or areas of the machine above local government restrictions.

Slippery Surfaces

- The surface of the platform has raised portions to stop slipping.
- The platform surface needs to be kept clean of mud and other material to help stop slipping.

Main Tank

- Danger - Confined space do not enter.
- Do not enter the tank for any purpose.

Safe Chemical Usage

The safe use of Agricultural (Ag) chemicals with this equipment is the responsibility of the owner/operators. All operators should be trained in the safe use of Ag chemicals. Goldacres suggest that a relevant course is completed by owners/operators prior to operation of this equipment as a spray unit.

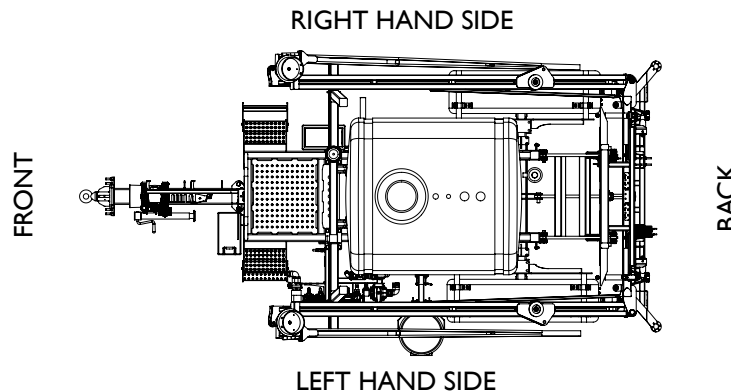
Safety Decals

Understanding safety decals and their purpose assists in the safe operation of your sprayer. Safety decals are there for your protection and it is the responsibility of the owner operator to replace damaged and/or missing safety decals.

Chapter 3

GENERAL INFORMATION & SPECIFICATIONS

Machine Orientation



General

Chassis

The chassis is an all steel construction, that is fully welded for superior strength. The chassis is grit blasted, primed and then protected by the Goldacres paint process for excellent chemical resistance and durability.

Paint Codes

Wheels: N23 Neutral Grey
Steel work: G13 Dark Green
Australian Standards AS2700

Tank

All tanks are constructed from UV resistant polyethylene. Polyethylene tanks have a very high chemical resistance. Due to the rotational moulding process, there can be variance in the overall dimensions of the tank which in turn results in 5-10% variation in the tank capacity. For this reason, calibration markings should be used as a guide only.

Agitation

The Supermix agitator is located at the back of the tank and is used to generate increased agitation within the tank. The pressure line to the Supermix agitator from the control manifold passes through a nozzle and then through the barrel into the tank. This causes extra agitation as flow around the agitator is sucked into the barrel and is then passed back into

the tank. To increase this venturi effect, the bypass flow from the electric regulating valve also passes through the barrel, multiplying the agitation effect. The Supermix agitator has an approximate capacity of 300 - 1300 L/min depending of the pump size and operating pressure. For further information refer to Chapter 10 'Lubrication & Maintenance'.

Spray Controller

In cab section control with electric pressure regulation is fitted as standard to 1500-2500 L sprayers. The 3000 L sprayers are supplied standard with a Raven SCS450 automatic rate controller or an optional ISOBUS connector with no console. Automatic rate controllers will maintain a user defined application rate automatically as the vehicle speed changes. In order to function, the automatic rate controller relies on a flow meter, speed sensor and control valve. For specific information on the Raven controller please refer to Raven operator's manual supplied and Chapter 6 'Calibration' of this manual.

Boom Nozzle Control

Motorised boom valves for control of boom section on/off function are fitted as standard. These are mounted on the boom centre section at the rear of the sprayer.

Continued over page

General

The number fitted is dependent on the number of boom sections and number of boom lines.

Filtration

Filtration is a critical part of the sprayer's performance.

As standard, these sprayers are fitted with:

- 1 x Suction filter (30 mesh)
- 2 x Pressure filters (1 x 80 & 1 x 100 mesh)
- Nozzle strainers (50 mesh)

Spray Pump

Fitted as standard on Goldacres equipment are Udor positive displacement and oil backed diaphragm pumps. The normal operating range is from 1 - 8 bar which is sufficient for efficient nozzle performance. A PTO drive is standard and a hydraulic drive is optional.

Chemical Induction

The method of chemical induction into your sprayer is dependent on the optional chemical induction equipment fitted to your sprayer:

Goldacres chemical induction equipment available includes:

- Chemical Probe
- Chemical Induction Hopper
- 12 V Chemical Transfer Pumps
- Direct Chemical Injection Modules

Booms

The sprayer can be fitted with a variety of boom sizes from 18 metres and up to 36 metres in width. TriTech booms feature hydraulic lift, fold and individual wing tilt controllable from the towing machine.

Goldacres TriTech booms feature pitch, roll and yaw suspension in order to provide a superior boom ride and assist in the efficient application of chemical to your target.

Nozzles

As information regarding nozzles is specific to those being used in your application, no specific reference is made to nozzle application rates or nozzle types in this operator's manual. Goldacres suggest the use of a current Teejet or Lechler nozzle selection catalogue for reference to nozzle sizes, outputs, spray patterns and general spraying information.

For more technical information on the function of spray nozzles and factors affecting their performance you can also use the Teejet 'User's guide to spray

nozzles'. The Teejet & Lechler nozzle selection catalogue and user's guides to spray nozzles are available from your Goldacres dealer; or as a free download from the Teejet web site: www.teejet.com

Lechler web site: www.lechler.de

Machine Limitations

All Goldacres equipment is subject to operating limitations, it is the operator's responsibility to ensure that this equipment is being operated within these limitations and appropriately to the operating conditions at hand. Goldacres do not endorse use of this machine for spraying at speeds greater than 20 km/hr and should not be used in ambient temperatures exceeding 40 degrees Celsius or below 5 degrees Celsius.

Each individual boom section has a maximum delivery of 35 litres per minute with clean filters fitted. With clean filters fitted, the maximum combined flow of all boom sections is limited to 140 litres per minute, or 50% of the pump flow, whichever is the lesser amount.

Custom Built Equipment

Where the owner of this sprayer has requested that custom built equipment or options be fitted to this sprayer it is necessary to understand that custom fabrication and engineering is subject to many variables. Goldacres cannot fully field test all custom built options prior to despatch, and owners of new sprayers fitted with custom built equipment or options need to understand that the functionality of these items may require refining in order to operate as desired.

Hand Wash Tank

A fresh water hand wash tank is located on the left hand side of the machine under the left hand access ladder. It has a bottle with a hand pump that can be filled with a liquid hand cleaner. The main tank can be filled with fresh water for operator use.

Ladder

The ladders are to be used to access to the platform and plumbing fittings on top of the tank. Always face the ladder and retain three points of contact with the ladder at all times when ascending and descending. The ladders should be stowed while the sprayer is operating to avoid personal injury or equipment damage.

Hydraulics

Electric over hydraulic spool valves allow the use of a number of hydraulic functions on the sprayer with only one set of tractor remotes. The hydraulic functions are then controlled from an electric switch box in the cabin. The valve block is located at the rear of the sprayer above the boom valves.

Prairie Pro sprayers can be set up for use on closed centre and open centre hydraulic systems. It is important that you are familiar with the operating system of your tractor prior to connecting your sprayer.

A brief overview of the different hydraulic systems follows below. Further information on your specific system should be supplied by your dealer if required.

Open Centre Systems

Open centre systems have a constant flow of oil from the tractor. Any flow not being used by the hydraulic circuit will be bypassed through the system and sent back to tank.

Axles

Prairie 4000, 5000 & 6500 litre sprayers can be fitted with rigid axles and Air Bag suspension.

The air bag suspension consists of a 12 volt air compressor; a ride height valve, 2 air bags, shock absorbers, axle (used as an air reservoir) and hosing.

The 12 volt compressor is powered up when the ignition is switched on. A fuse is fitted to the ignition relay box to protect the compressor circuit. The compressor, located in the right hand pod, has a pressure cut out switch fitted to it which cuts the power to the compressor when the reservoir recommended pressure is achieved. When the pressure in the reservoir drops below approximately 70 PSI, the compressor will start again. The pressure cut out switch can be adjusted by turning the nut at the end of the spring to apply more or less pressure to the contact spring. The recommended maximum pressure to run in the air bag system is 110 PSI. Optimum pressure is 100 PSI. If the compressor runs continually there may be an air leak present. All hoses and fittings must be checked and repaired if necessary.

The compressor draws its air through a paper element filter mounted on the right hand side boom rest. This filter element must be cleaned daily.

In dusty conditions this filter must be cleaned on a more regular basis.

Closed Centre Systems - Pressure Compensated

Tractors fitted with closed centre, pressure compensated, hydraulic systems have a variable displacement pump which only delivers flow at the rate necessary to maintain a specified pressure.

Closed Centre Systems - Load Sensing

A closed centre load sensing system is a variation of the pressure compensated system and are commonly designed to reduce hydraulic circuit heat generation.

This system senses a change in flow, and or pressure, and causes the pump to compensate by varying the pump flow. In these circuits no oil is bypassed as only the oil required is being sent to the valve.

Ground conditions, ground speeds and wind conditions can all be factors in determining what measures are necessary to supply clean air to the compressor.

A gauge that displays air pressure is located on the front of the machine.

Further information on air bag suspension and axles can be found in the maintenance and troubleshooting chapters.

Wheels & Tyres

All tyres used on Goldacres sprayers have been designed to carry the maximum loaded weight of the sprayer when travelling at 20 km/h. The load capacity of the tyres decreases as travelling speed increases so it is important to heed this travelling speed limit.

The tyre pressure also needs to be checked regularly (check every 8 to 12 hours of operation) and maintained at the required tyre pressure.

There are many factors concerning the appropriate tyre pressure for a particular tyre and load. For example, the tyre size, rim type, tyre status (driven or free rolling), load, speed, haul length and ply rating all need to be considered when determining the tyre pressure.

The rated pressure and capacity, shown in the chart below, is applicable when the machine is stationary. The cyclic loading pressure & km/hr is applicable for machines that are loaded and moving.

DETERMINING CORRECT TYRE PRESSURE:

- Determine the maximum weight of the sprayer when loaded (do not forget to add the weight of the any other tanks on the sprayer when filled).
- Allow for each tyre to carry half the maximum loaded weight of the sprayer (this does not allow for any load on the tractor pull or cyclical loading, which provides for a safety margin).
- Determine what tyre size and ply is on the sprayer.
- Determine what appropriate tyre pressure will provide the load capacity required by the respective tyre as indicated in the following table.

For further information on wheels and tyres please refer to Chapter 10 'Lubrication & Maintenance'.

NOTE: If a tyre is replaced with a different brand or size, please contact the supplier for correct air pressures to suit the load carrying capacity of this machine.

NOTE: $\text{PSI} = \text{Kpa} \times 0.145$

EXAMPLE: $240 \text{ Kpa} \times 0.145 = 34.8 \text{ PSI}$

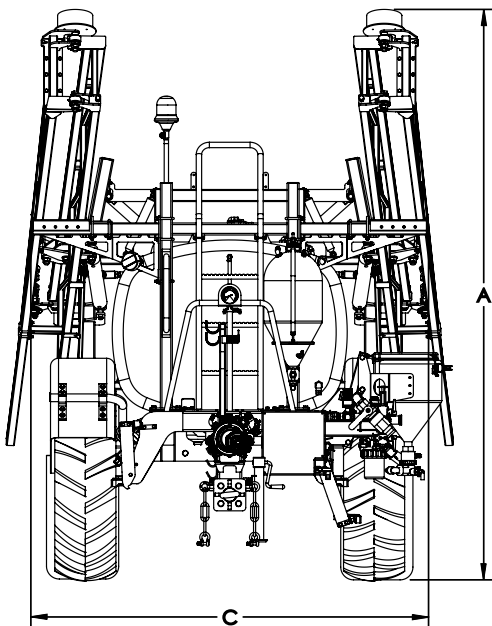
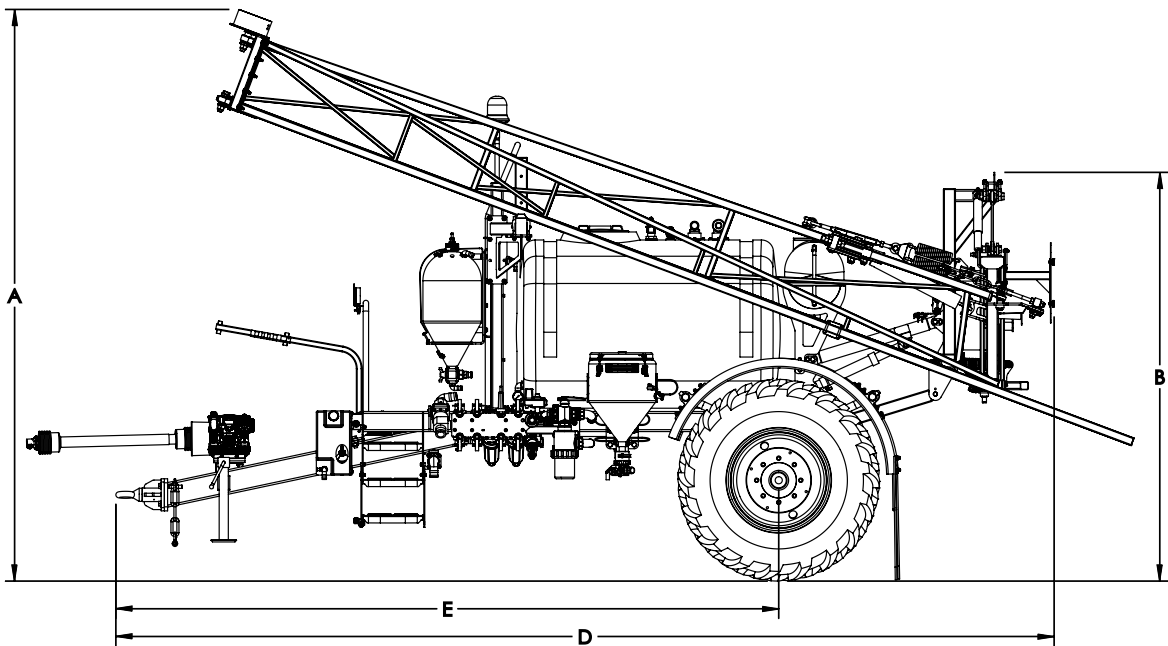
TYRE SIZE	PLY	RATED PRESSURE (KPa)	RATED CAPACITY (Kg)	CYCLIC LOADING PRESSURE (KPa)
14.9 x 24	8	180	1600	234
16.9 x 34	10	200	2360	260
18.4 x 38	16	317	4400	322

Dimensions

The following information is provided as a guide only.
Variations in dimensions may occur without notification.

To ensure that the dimensions are accurate for your sprayer, it is recommended that you measure your sprayer individually.

MODEL	BOOM SIZE	A FRONT HEIGHT	B REAR HEIGHT	C WIDTH	D TOTAL LENGTH	E WHEEL- BASE
2524	24m	3560	2550	2580	5850	4130
3024	24m	3480	-	2760	7500	4800



Identification & Parts Ordering

When ordering parts or requesting service information for your sprayer it is important to quote the serial number of your machine, and the purchase date, in order to receive accurate information. The location of the serial number plate on your machine is shown in the picture.

NOTE: To identify the exact options fitted to your particular machine, refer to the original quotation and/or build sheet. If needed, a copy of the buildsheet may be obtained by contacting your dealer and quoting your machine serial number as described above.

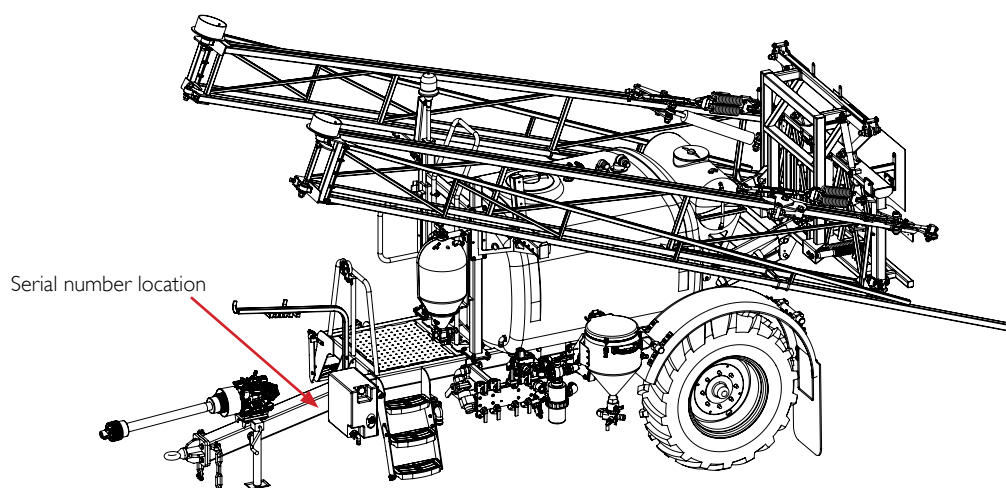
When ordering parts from your Goldacres dealer, please quote:

- Machine serial number
- Part number required
- Part description
- Quantity required

The parts manual supplied with this machine includes all the relevant information that you need when ordering parts from your dealer. When returning parts to a Goldacres dealer for service or repair, all parts **MUST** be cleaned thoroughly before sending them. Dealers cannot expose technicians to the many potentially hazardous pesticides and substances that are in use.

NOTE: Please ensure that all parts are clearly labelled with the owner's details, and a brief description of the fault. Dealers are not liable for the return of any goods to a Goldacres Dealer. The goods must be returned to the point of sale.

Genuine Goldacres parts only should be used on Goldacres equipment.



Chapter 4

CABIN

Not Applicable

Chapter 5

DRIVETRAIN

Not Applicable

CALIBRATION

Manual Rate Control - Calibration

Spraying is a complex task, that is affected by many variables. It is the responsibility of the operator to be familiar with spraying variables and to understand the spraying process prior to operation.

In general, the operator should know:

- The target application rate
- The required operating (spray) pressure
- The speed of travel
- The desired droplet size

To make the spray application as accurate as possible, it is critical that your spray equipment is regularly calibrated.

As the sprayer is moving, the ground speed and flow rate must be considered to achieve the desired application rate per area. Flow adjustments are made via the control box in the cabin.

As the ground speed increases, the flow to the booms required to maintain the application volume needs to be increased. Increasing the flow will result in the pressure (as displayed on the gauge) increasing. Conversely, as the ground speed decreases, the required flow to the booms, as well as the pressure must be decreased to maintain a constant application rate.

Refer to your nozzle charts for more specific details on determining the variables required to meet your desired application rate.

Auto Rate Control - Calibration

Spraying is a complex task, that is affected by many variables. It is the responsibility of the operator to be familiar with spraying variables and to understand the spraying process prior to operation.

In general, the operator should know:

- The target application rate
- The required operating (spray) pressure
- The speed of travel
- The desired droplet size

To make the spray application as accurate as possible, it is critical that your spray equipment is regularly calibrated.

The Raven automatic controller is designed to improve the uniformity of spray applications. Raven controllers will monitor and control the determined application volume, but prior calculations will be required to ensure spraying pressures do not exceed operating parameters.

The Raven system comprises a console, flow meter, speed sensor and liquid flow control valve.

As the sprayer is moving, the console records ground speed and then calculates the amount of flow required to maintain the respective application rate at that speed. The console monitors the amount of flow being used via the flow meter and then determines if the flow is correct for that speed. Flow adjustments are made by the control valve which varies the amount (volume) of bypass and thus the volume being applied via the boom is controlled.

When the console is in the automatic mode, as the ground speed increases, the flow to the booms required to maintain the application volume will be increased. This will result in the pressure (as displayed on the gauge) increasing. Conversely, as the ground speed decreases, the required flow to the booms, as well as the pressure, decreases.

When the console is in the manual mode, as the ground speed increases, the pressure and flow will remain constant and the application volume will decrease. Similarly, as the ground speed decreases, again the pressure and flow will remain constant and the application rate will increase.

Record your console calibration information in the table below for future reference:

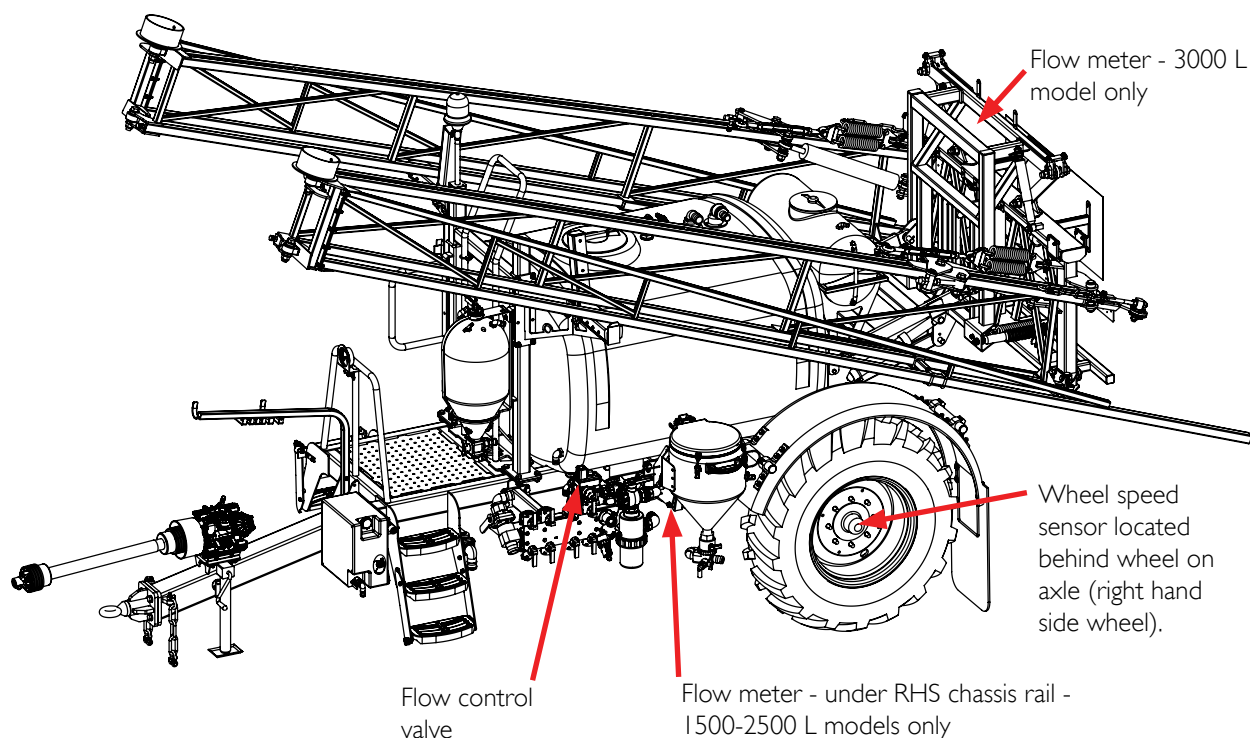
PARAMETER	VALUE	UNIT
Boom Cal 1		cm
Boom Cal 2		cm
Boom Cal 3		cm
Boom Cal 4		cm
Boom Cal 5		cm
Speed Cal		-
Meter Cal		-
Valve Cal		-
Rate 1		L/Ha
Rate 2		L/Ha
Pump Cal (1)		RPM

$$\text{L/min (per nozzle)} = \frac{\text{L/ha} \times \text{km/hr} \times \text{W}}{60,000}$$

$$\text{L/ha} = \frac{60000 \times \text{L/min (per nozzle)}}{\text{Km/hr} \times \text{W (metres)}}$$

$$\text{Km/hr} = \frac{\text{Metres} \times 3.6}{\text{Time (seconds)}}$$

Auto Rate Control - Key Component Locations



Auto Rate Control Calibration - Flow Control Valve

The flow control valve is located behind the EZ control station and regulates the flow going to the boom sections directed via the console. It controls the flow to the boom by regulating the amount of liquid that bypasses back to tank.

The flow control valve is a positive ball valve which means it can control flow infinitely to the boom from 0 L/min to the maximum pump output, dependant on system pressure.

The flow control valve can be operated in manual mode from the console for boom priming, flushing and also troubleshooting.

Auto Rate Control Calibration - Flow Meter

If the sprayed volume from the controller does not match the tank volume that was sprayed out, then the flow meter will need to be checked and a new updated figure input into the 'Meter Cal' in the Raven controller:

- On the flow meter on the sprayer, there will be a calibration number attached to it on a white sticker. The number that is applicable is the one in square brackets, i.e. [185]. Note this number down as this is the number that should be entered as the 'Meter Cal' number.

- The flow meter should be checked at the start of every spraying season and periodically during the season.
- The simplest way to check the accuracy of the flow meter is to fill the tank to a previously determined volume mark (usually top fill marking), while making sure the tank is level.
- On the Raven controller, make sure the 'Total Volume' reads '0'.

Continued over page

Auto Rate Control Calibration - Flow Meter

- Perform a self test, choose a high speed and high rate so that the tank will empty relatively quickly but make sure the pressure does not exceed 60 PSI.
- When the tank is empty, on the Raven controller press 'Total Volume' to read what the Raven flow meter has output to the boom. Record the reading.
- Check the volume of the tank to see what has been sprayed out to the boom. Record the reading.
- Compare the reading from the controller with the known volume from the tank. If there is a relatively large discrepancy (i.e. more than 50 litres out of a 3000 litre tank), the flow meter should be removed from the sprayer, disassembled and the condition of the turbine checked and cleaned. It should be able to spin freely.
- The flow meter should then be reassembled and replaced on the sprayer. Perform the volume check again and if there is still a discrepancy, the 'Meter Cal' value can be changed

i.e. If volume from the controller reads 3100 litres instead of 3000 litres and the original Meter Cal value is 185, then:

New 'Meter Cal' value = $(185 \times 3100) / 3000 = 191$

Every sprayer should be calibrated regularly to ensure minimal error in the application rate. A nozzle selection chart indicates what application rates are to be expected. Variations due to nozzle wear, ground speed error and pressure irregularities can all add up to result in large application rate errors.

Auto Rate Control Calibration - Speed sensors

Raven automatic rate controllers can utilise a speed reading from:

- Wheel speed sensor
- GPS receiver
- Radar speed sensor

Wheel Speed Sensor

The wheel speed sensor is fitted to the right hand side wheel of the sprayer and uses four magnets (2 north pole (red) and 2 south pole (black)) fitted onto the rim to measure speed.

A north and south magnet must pass the sensor before a pulse is counted. The sensor must be mounted between 12mm & 19mm from the face of the magnet to receive a reading. The magnets must pass directly through the centre of the sensor face.

The speed calibration figure on the console indicates a measurement of the circumference of the wheel as it rolls across the ground. The wheel speed sensor detects when the wheel completes one revolution and the console calculates the distance the wheel travels - therefore giving a km/hr reading.

If the ground speed display reading is incorrect then the calibration and sensor condition must be checked (see Chapter 11 'Troubleshooting').

GPS Receiver

If a GPS unit is fitted, GPS ground speed can be obtained and used in place of the wheel speed sensor.

To receive a speed reading from the GPS unit a **pulsed niema** string must be connected to the speed cable of the console. The console must then be set up to accept GPS speed. This is called radar in the console calibration settings. When using GPS the console speed cal figure is 200 initially and then can be fine tuned from this figure. See 'Auto Rate Control Calibration - Raven SCS450' section for further information on console setup.

Radar Speed Sensor

The console can also utilise a radar signal for ground speed reading.

A 't-harness' can be fitted to the tractor radar harness to send a pulsed signal to the console speed harness. The console must be setup to receive speed as "Radar."

When using a radar the console speed cal figure is 200 initially and then can be fine tuned from this figure. See 'Auto Rate Control Calibration - Raven SCS450' section for further information on console setup.

Auto Rate Control Calibration - Raven SCS 450

INITIAL CONSOLE PROGRAMMING

After the console has been installed and turned on it will require a one-time initial programming. For more detailed information about console features and operation consult the Raven SCS 450 Installation and Service manual.

STEP 1: Unit of measure options will be displayed. Set your unit of measure by pressing [CE] repeatedly until the desired unit is displayed (SI is the metric unit in volume per hectare) and then press [ENTER].

STEP 2: Now choose your speed sensor type by pressing [CE] repeatedly to cycle the two options and then press [ENTER].

SP 1 - Wheel-Drive or Drive-Shaft Speed Sensor

SP 2 - Radar Speed Sensor

STEP 3: The console will now ask for the valve type. Press [ENTER] to accept 'C-SD-Standard Valve' for this sprayer.

IMPORTANT: Steps 1-3 are very important because the system will appear to function properly but if the units are incorrect, the quantities will be very inaccurate. If an error has been made whilst calibrating these 2 steps, turn the console off then turn back on again while holding [CE] to reset and clear all memory. To see what has been programmed, press and hold [SELF TEST] for about 5 seconds until the programmed information is displayed (flashing and toggling).

STEP 4: Press [BOOM CAL] then [ENTER]. Enter boom section 1 width in centimeters and press [ENTER].

e.g. 6 m = 600 cm. Press [6] , [0] , [0].

The Raven 450 console has provisions for handling up to 5 boom sections. To measure the boom width for each boom section, count the number of nozzles in each section and multiply by the nozzle spacing. i.e. 12 nozzles in one section at 50 cm (0.5 m) spacings becomes $12 \times 0.5 \text{ m} = 6 \text{ metres}$.

STEP 5: Press [1] (up arrow) to select boom section 2 (B-02) Enter section width in centimeters and then press [ENTER].

STEP 6: Enter values for remaining boom sections using [1] (up arrow) and [2] (down arrow) to select them. If a boom section is not needed, enter the width value as '0'.

STEP 7: Press [SPEED CAL] then [ENTER]. Enter speed CAL in decimeters e.g. 477 (1 metre = 10 decimeters) then press [ENTER].

Speed CAL is the distance measured by 10 revolutions of the speed sensor wheel. This is best done with the tank half full of water which best simulates average wheel diameter between full and empty loading and measured on ground that is typical to what will be encountered when spraying. Also note the tyre pressure when this procedure is performed. This tyre pressure needs to be maintained for the speed CAL to be accurate. The speed CAL should be checked at the start of every spraying season as the speed CAL may need to be altered to compensate for tyre wear, etc.

NOTE: For SCS450 console with 4 wheel magnets (2 red and 2 black) - use the measured distance converted to decimeters for the speed CAL entry (1 metre = 10 decimeters).

For SCS450 console with 2 wheel magnets (1 red and 1 black) - use the measured distance converted to decimeters and then multiplied by 2 for the speed CAL entry (1 metre = 10 decimeters).

STEP 8: Press [METER CAL] then [ENTER]. Enter Meter Cal for litres. Press [ENTER] (e.g. 185). Meter Cal is the Calibration number on the Flow Meter white tag. The required number for litres is the number in square brackets.

STEP 9:
Press [VALVE CAL] then [ENTER]
Enter '2123'
Press [ENTER]

STEP 10:
Press [RATE 1] then [ENTER]
Enter Rate 1 in litres per hectare e.g. 60.
Press [ENTER]

STEP 11:
Press [RATE 2] then [ENTER]
Enter Rate 2 in litres per hectare e.g. 75.
Press [ENTER]

NOTE: RATE 2 can be the same as RATE 1 if only one rate is to be used.

Continued over page

Auto Rate Control Calibration - Raven SCS 450

STEP 12: OPTIONAL

Press [VOL/TANK] then [ENTER]
Enter the volume in the tank in litres at start of spraying e.g. 3000.
Press [ENTER]

STEP 12: OPTIONAL

Press [TIME] then [ENTER]
Enter the time of the day e.g. 10:30.
Press [ENTER]

STEP 14: HYDRAULIC DRIVE SPRAY PUMP ONLY

Press [SPEED] and hold down for 5 seconds until speed value begins to flash. When the pump is fitted with hydraulic drive, the flashing 'speed' figure represents the pump's RPM.

TO ZERO INFORMATION WHEN ENTERING NEW FIELD

When entering a new field, the previous data in the console can be changed to zero so that the new data is current for that field only.

NOTE: Write down all necessary data before removing data from console memory

TO ZERO OUT DATA IN AREA AND VOLUME

STEP 1: Write down the previous information for Area and Volume.

STEP 2: Press Area or Volume (Total or Field for SCS450 consoles).

STEP 3: Press [ENTER]

STEP 4: Enter '0'

STEP 5: Press [ENTER]

The Area and Volume will now count from zero for the new field.

SELF-TEST SIMULATION

By simulating speed, the Raven controller can be tested without having to move. The Raven works in rate (i.e. litres per hectare) and a speed is required in order to calculate a rate. The self-test simulation provides the console with a simulated speed even though the sprayer is stationary and thus the console will be able to display a rate.

This self-test should be performed when first testing the system so that the operator can become familiar with the working system.

STEP 1: Press [SELF TEST] then [ENTER]

STEP 2: Enter speed (i.e. 12.0 for 12 km/h)

STEP 3: Press [ENTER]

STEP 4: Press [SPEED] to verify speed

The sprayer will now operate so that it can be tested. Switch the boom sections on and off to see that the system compensates and the applied rate returns to the required rate. The self-test will cancel when motion from the vehicle is detected by the speed sensor. For radar speed sensor, disconnect the speed cable going into the back of the console when performing a self-test.

Nozzle Calibration

As part of your daily sprayer calibration, Goldacres recommends you carry out a simple “jug test” to ensure the spray nozzles you are using are delivering the correct amount of chemical, as stated in your nozzle supplier’s rate chart.

Jug Test

The method of carrying out the “jug test” is described below.

You will need:

- A calibrated measuring container that can measure the medium in litres, in 10 ml increments e.g. 0.45 L.
- A timing device that counts seconds.
- A pressure gauge mounted at the nozzle tip to verify the system pressure being delivered at the nozzle. Goldacres part number GA5077983 will enable mounting of a suitable gauge to the nozzle body bayonet fitting (not including gauge).

PROCEDURE:

1. Check the plumbing system for kinked or obstructed hoses and repair or replace any hoses that might restrict the normal flow of the liquid.
2. Start your sprayer and initiate a ‘self test’ procedure on your rate controller console. Set the application rate and speed to the values given in your rate chart that match your desired spray output.
3. Then place the jug under one of the nozzles, for exactly 1 minute and record the volume of liquid collected.
4. Repeat the test over a representative sample of the jets in each boom section.
5. Compare the volume collected from each nozzle to the stated volume in your nozzle supplier rate chart. Variation should be no more than plus or minus 10 %.

In the event that any of your nozzles do not deliver the required volume, a further investigation is required. This may include, but not be limited to;

- Cleaning the nozzles using the method recommended by the nozzle supplier.
- Replacing the nozzles.

- TeeJet advise that nozzles that flow greater than +10% of their stated volume are ‘worn out’ and should be replaced.
- Cleaning nozzle filters.

NOTE: Uneven volumes from individual nozzles will result in variations in the application rate across the width of the boom. Spray efficiency will be reduced. **Crop damage may result.**

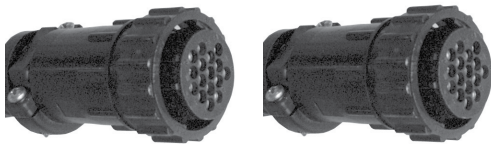
If you have any further questions, Goldacres recommends that you contact your nozzle supplier or your Goldacres dealer for additional information.

Download your free copy of ‘A user’s guide to spray nozzles’ from the TeeJet website. Also Lechler nozzle selection catalogue and Users guides to spray nozzles are available from your Goldacres dealer, or as a free download from the TeeJet web site: www.teejet.com or Lechler web site: www.lechler.de

PRE-OPERATION

Drawbar Connections

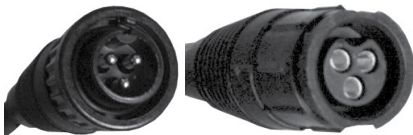
The standard drawbar connections are as shown below. It is important that the dielectric grease (supplied with each sprayer) is applied to electrical connections prior to connection. This keeps the electrical terminals in good condition by preventing corrosion. Electrical conductivity is also maximised which prevents hard-to-diagnose electrical failures.



Raven SCS440/450 male & female connectors



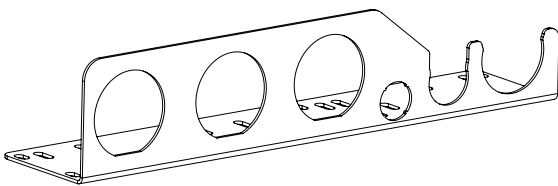
Hydraulic hose connections



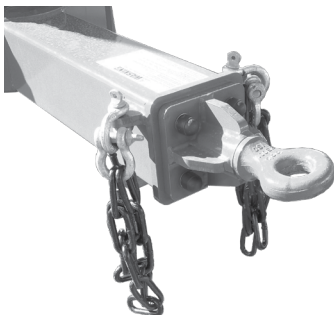
Raven male and female speed sensor connections



Tail light connection



Cable mount plate for tractor



Safety chains

Tractor Connection

Prior to tractor to sprayer connection, it is important that the operator has read and fully understood this operator's manual.

TRACTOR TO SPRAYER CONNECTION

1. Ensure that the tractor is suitably rated to safely tow the sprayer and that the drawbar pin size matches the hitch on the sprayer. The standard hole size is 50mm. A replaceable insert (Part number GA4582455) can be purchased to reduce wear if required. A replaceable bush (GA5075075), reduces the size of the hole in the hitch if a smaller pin is to be used.
2. With the sprayer parked on a level surface, use the sprayer jack to raise the sprayer hitch in line with the tractor hitch.
3. Reverse the tractor into sprayer hitch until aligned, and insert drawbar pin (not supplied). Then connect safety chains.
4. With the sprayer securely attached to the tractor, raise the jack until weight is transferred to the tractor. Then raise the jack and store in the transport position.
5. Fit the PTO shaft (if applicable).
 - Grease the PTO shaft as per the lubrication schedule
 - Ensure that all safety guards and chains are in place

NOTE: It is important that the instructions 'PTO Shaft Fitment' are followed for first time setup.

NOTE: The wide angle joint must be connected to the tractor PTO shaft.

Hydraulic Drive Spray Pump

Diaphragm pumps can also be driven by a hydraulic motor which is bolted directly to the front of the pump.

The oil line to the hydraulic pump is fitted with a needle valve that regulates oil flow to the pump. Many tractors feature hydraulic oil flow regulation in the cabin, however this needle valve can be used to control the flow on tractors that are not fitted with hydraulic oil flow regulation.

For hydraulic drive pumps - connect hydraulic hoses to tractor remote outlets. See to chapter 3 'General Information & Specifications' for important hydraulic information.

6. Fit the spray controller and any other switch boxes supplied in tractor cabin. Make sure that all controllers and switch boxes are securely mounted.
7. Connect any power leads from Raven Console directly to battery.
8. Connect drawbar connections.

All hydraulic hoses except two, have a tag zip tied to them that denotes what they are for. Connect the hoses to the appropriate place on the tractor. Ensure that the connection points are clean before fitting to the tractor.

The two hydraulic lines that don't have tags on them are the pump lines. The pump can run in either direction so it does not matter which port (pressure or tank) that the hoses go into.

If the sprayer is not fitted with spool valves, it is very important that the hydraulic lines are connected in the correct pairs to the tractor remotes.

If not already done, apply some dielectric grease to the electrical connections. Such as to the wiring loom, speed sensor cable, tail light plug and so on. Then connect them to the appropriate plug at the rear of the tractor.

Disconnection of the sprayer from the tractor is the reverse of the above instructions.

Where the tractor has the capability to regulate flow from the cabin, it is recommended to close the needle valve and adjust the hydraulic oil flow from the tractor to set the pump running at 400 - 500 rpm. Do not exceed 540 RPM.

SETTING HYDRAULIC PUMP SPEED

See Chapter 6 'Calibration' for more detailed setup information when a Raven SCS450 console is used to control the hydraulic spray pump speed.

PTO Shaft Fitment

Wide angle PTO shafts are fitted as standard to Prairie Evolution sprayers. When using/hitching a sprayer (especially for the first time) the following critical points concerning the PTO shaft must be considered:

MAXIMUM PTO OPERATING LENGTH

Try to obtain the greatest possible overlap. In its working position, the PTO shaft must not be extended by more than half the profile overlap (P_u) available when fully compressed (L_z). The maximum PTO operating length is shown on the diagram below as 'Lb'.

PTO SHAFT LENGTH ADJUSTMENT

1. Hold the shafts next to each other in the shortest working position and mark them.
2. Shorten the inner and outer guard tubes equally.
3. Shorten inner and outer sliding profiles by the same length as the guard tubes.
4. Round off all sharp edges and remove burrs.
5. Grease sliding profiles before reassembling.

NOTE: It is important that enough "travel" is allowed in the PTO shaft to ensure that it does not collapse fully when travelling through a ditch etc and cause damage to the pump.

MAXIMUM PTO JOINT OPERATION

Ensure equal joint angles. For wide angle PTO shafts the following are guidelines for operation:

Continuous operation - 25 degrees
Short duration - 80 degrees
Stationary - 80 degrees

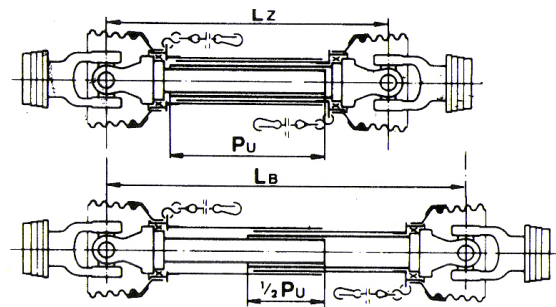
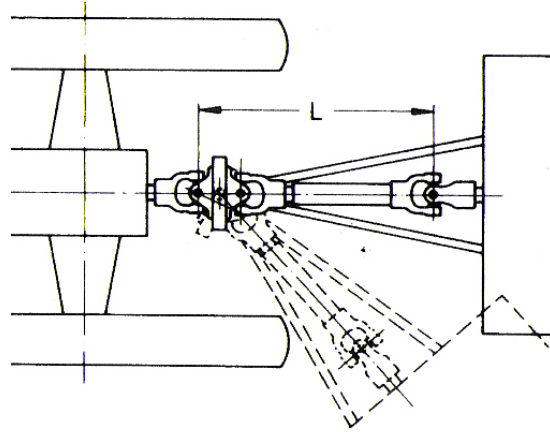
PTO SHAFT COUPLING

Press in the locking pin and simultaneously push PTO shaft onto pump or tractor PTO shaft until pin engages. Pull PTO shaft back to make sure pin has engaged and the shaft cannot come off.

CHAINS

Chains must be fitted so as to allow sufficient articulation of the shaft in all working positions.

NOTE: The PTO shaft must not be suspended from the chain.



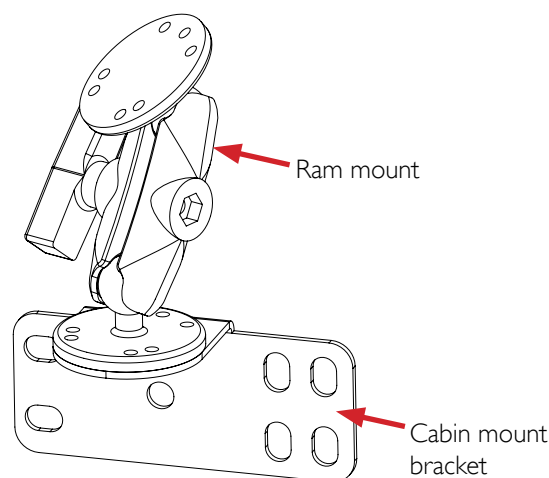
Console Mounting

The mounting of the consoles within the cabin of your tractor is a critical part of the set up process. It is important that the consoles are mounted in the cabin in such a way that it cannot cause harm to the operator under any circumstance while also being mounted in a user friendly way.

When the sprayer is removed from the tractor, and the consoles are to remain fitted, please ensure that all consoles remain firmly mounted and cannot become a projectile.

For specific information on mounting the consoles, please refer to the Raven installation and service manual supplied.

If there are mounting holes in the pillars of the tractor, a bracket (GA4522930) is supplied with the console mounting kit to allow the console to be mounted to the pillar:



Above: Some tractors may have pre-drilled mounting holes on the pillar which can be used with the cabin mount bracket (GA4522930) to mount the rate control console.

Console Connection - Raven SCS450

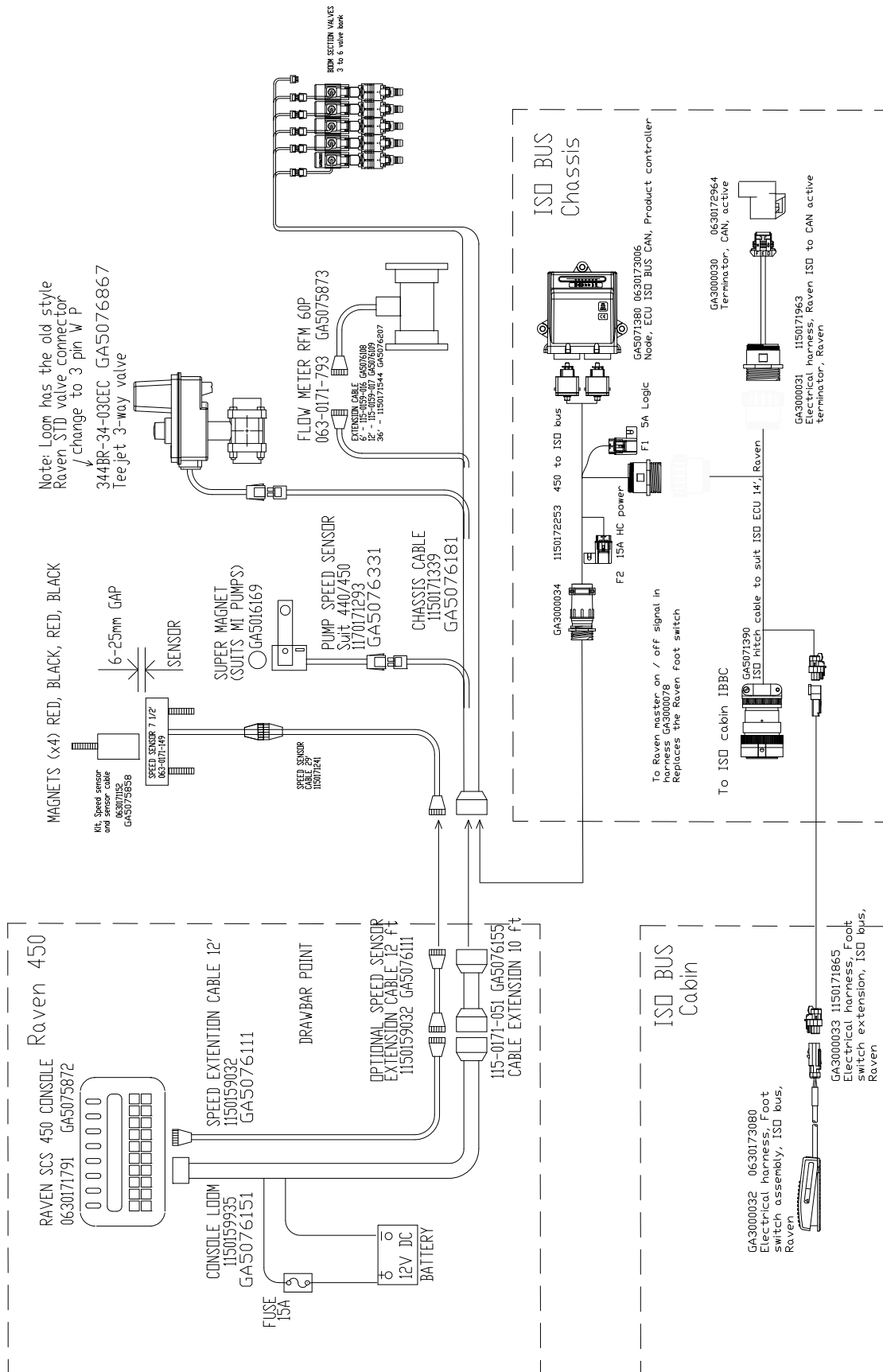
The consoles should be connected according to the electrical schematics following in this chapter. These schematics provide you with a layout of all connections to ensure that the system is properly connected prior to operation.

CONSOLE POWER WIRING

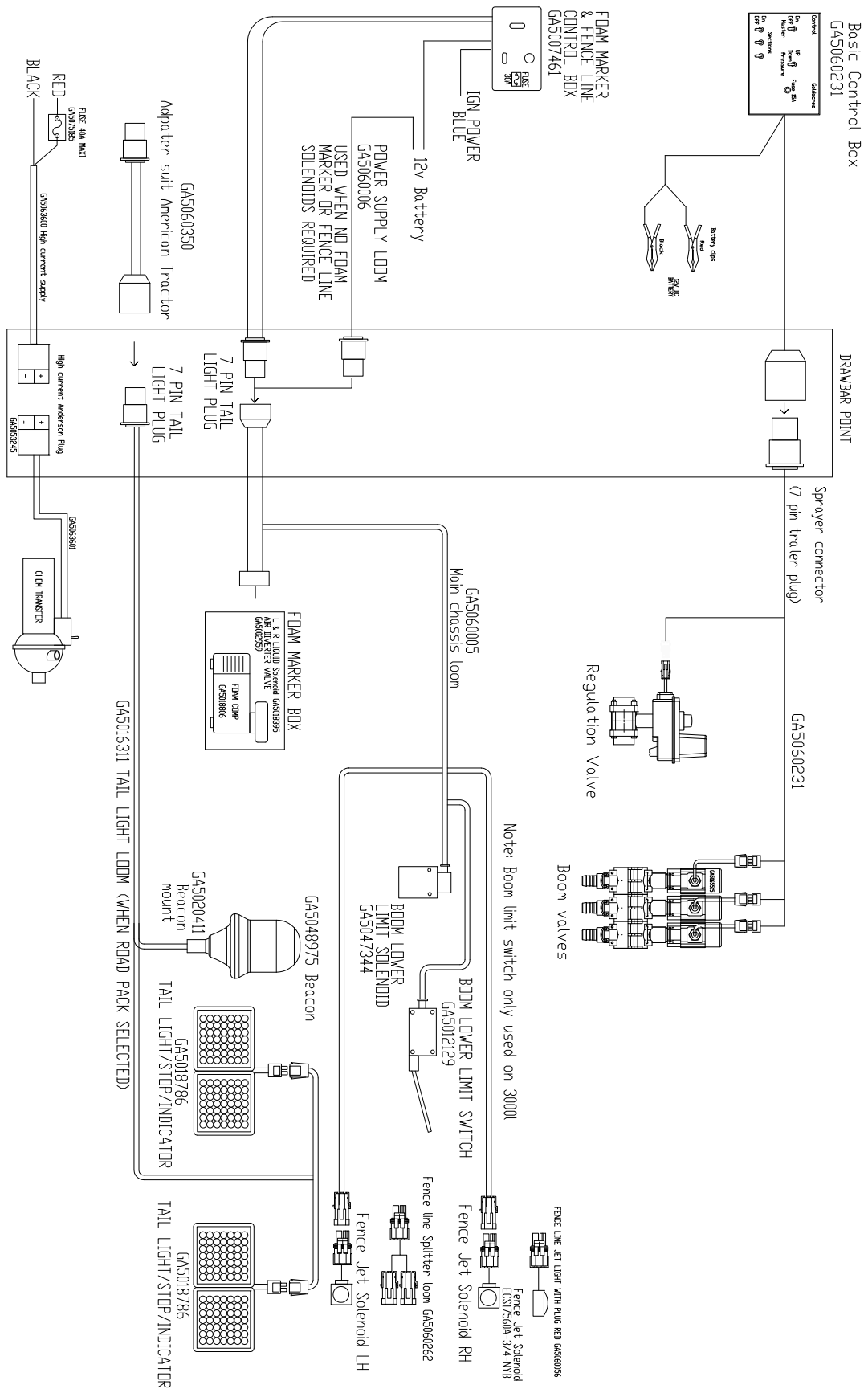
With the consoles mounted in the cabin, turn the power switch to OFF and route the positive red (+) and negative black (-) battery wires to a 12V battery. Attach the white battery wire to a negative terminal and the red battery wire to a positive terminal.

NOTE: The negative should be connected last to prevent the chance of a short.

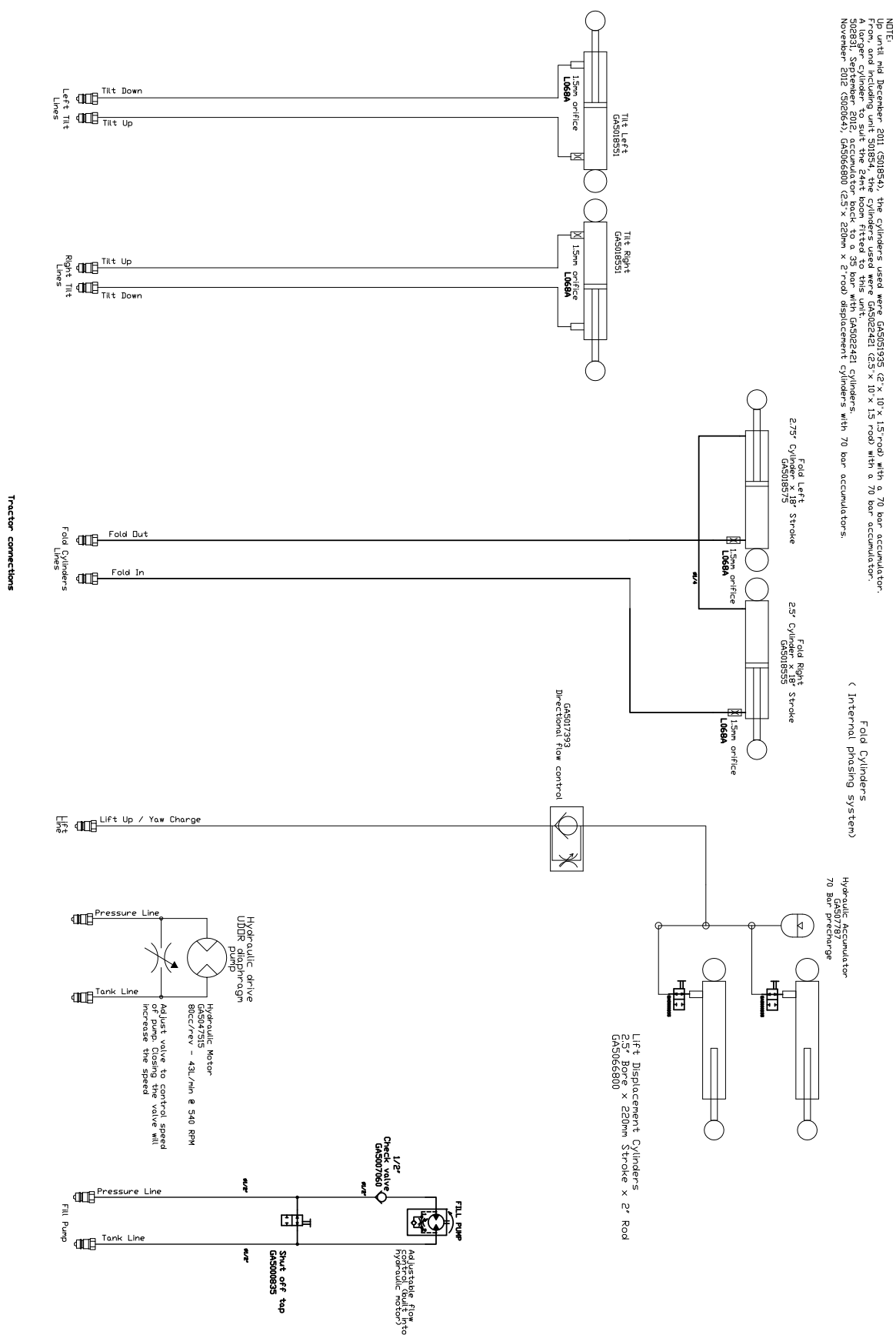
Wiring Schematic - Raven SCS450 or ISOBUS



Wiring Schematic - Manual Rate Control



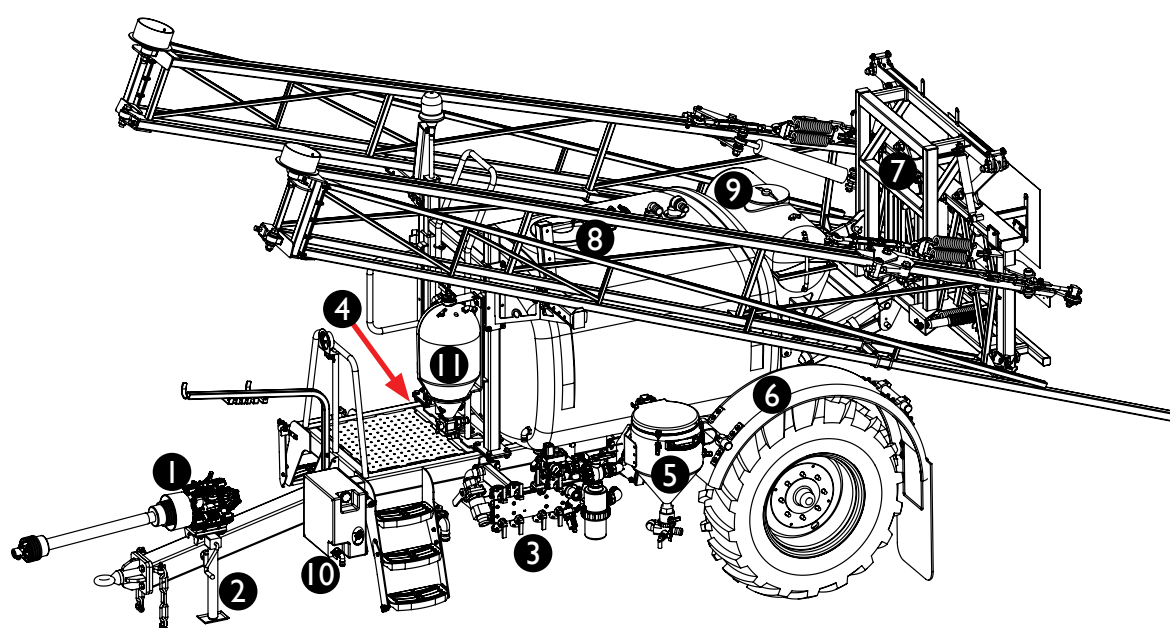
Hydraulic Schematic



Chapter 8

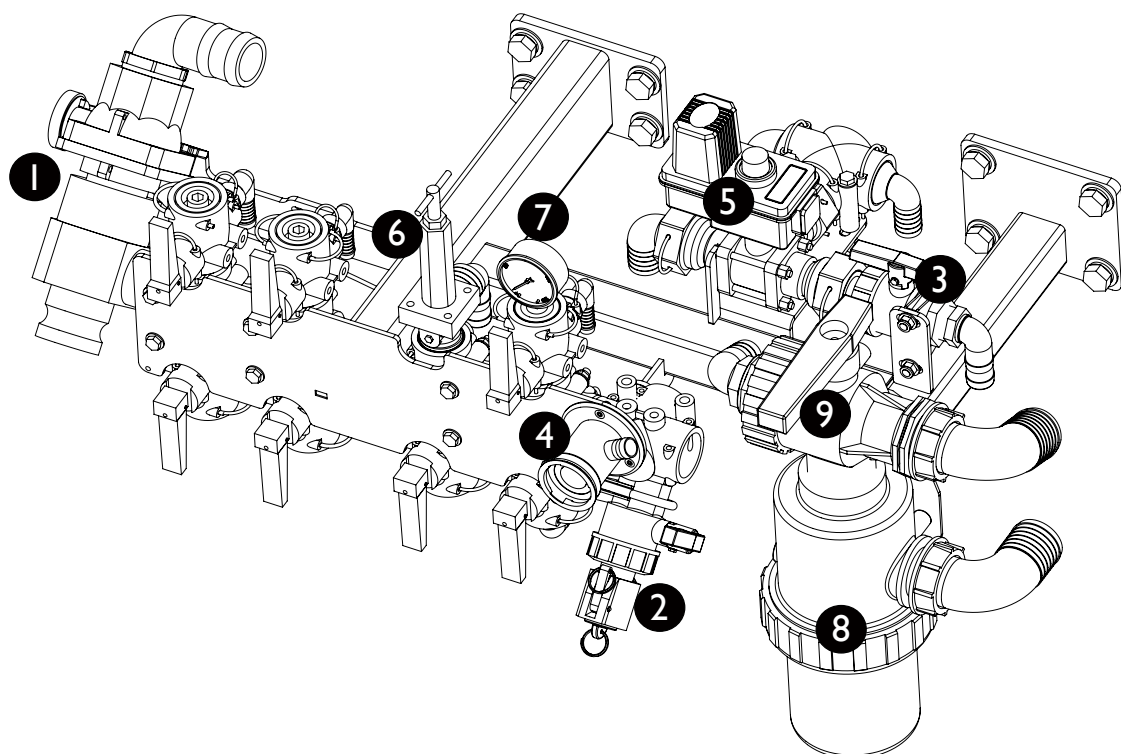
OPERATION

Key Features



NUMBER	FEATURE
1.	Spray pump
2.	Jack
3.	EZ control fill & pressure manifold
4.	Dual pressure filters (on opposite side of chassis)
5.	Chemical induction hopper (Optional)
6.	Mudguards
7.	Boom paralift
8.	Main tank lid
9.	Flush water tank
10.	Hand wash tank
11.	Transcal (Optional)

EZ Control



NUMBER	FEATURE
1.	Main tank fill
2.	Chemical probe coupling
3.	Bypass
4.	Micromatic rinse socket
5.	Flow control valve
6.	Pressure relief valve
7.	Manifold pressure gauge
8.	Suction filter
9.	Suction filter valve



EZ Control Functions

EXTERNAL WATER DELIVERY	USE
Main tank rinse nozzles	Turning on this function allows the use of the tank rinse nozzles with larger quantities of fresh water making it useful for a more thorough flushing/decontamination.
Fresh water fill	Used to fill the rinse water tank.
Foam marker fill	Used to fill the foam marker tank.
Transcal rinse	Allows external fresh water to be used in rinsing the Transcal circuit.

NOTE: These functions are only available when external water is being pumped into the system.

PRESSURE DELIVERY	USE
Hopper	Turn ON to use induction hopper
Venturi	Turn ON to use Transcal or chemical probe
Agitator	Turn ON to activate agitator
Bypass	Turn ON bypass when in spray mode
Pressure relief	Used to adjust manifold pressure
Manifold pressure gauge	Indicates the manifold pressure

NOTE: These functions only available when the main spray pump is operating - pressuring the system.

Tank Filling

When filling the sprayer it is necessary to connect to an external water source.

The main tank should be filled through the 3" fill point mounted to the side of the EZ control station on the left hand side of the sprayer. This line fills through the top of the tank and then through a hose inside the tank so that the water is deposited in the centre of the tank. Water can then be pumped into the system from an external pump. Filling progress can be monitored via an optional fill flow meter (see Chapter 12 'Optional Accessories').

WARNING: Water weighs 1 kg per litre. Conversion factors must be used when spraying liquids that are heavier than water. The total weight of the liquid being sprayed should not exceed the equivalent weight of a full tank of water. Exceeding this weight, can lead to sprayer damage.

For example: Liquid nitrogen has a density of 1.28 kg per litre. The tank size might be 5000 L.

$$5000 \text{ L} / 1.28 \text{ kg} = 3906 \text{ L}$$

This means that the total volume of liquid Nitrogen allowed in a 5000 L tank is 3906 L.

This rule applies for all tanks sizes. If unsure about the density/weight of the chemicals being applied, contact your agronomist or chemical supplier.

MAIN TANK FILL PROCEDURE

1. Connect the fill hose (not supplied) to the 3" fill cam lock coupling which is mounted to the EZ control station on the left of the sprayer.
2. Make sure that the main tank fill handle on the EZ control is in the OFF position (so that there can be no flow coming out of the tank if it is not already empty).
3. Turn the fresh water pumping system on (make sure the pressure does not exceed 75 PSI).
4. Turn the EZ control main tank fill handle ON. The main tank should now be filling.
5. When the required amount of water has been transferred into the main tank, stop the flow by turning the main tank fill to OFF.

EZ Control External Water Delivery Station

The external water delivery station allows several filling functions of the sprayer to be performed simultaneously.

1. With fresh water coming into the system as per "Main tank fill" instructions, ensure that all flip valves, including the "main tank fill" ball valve, on the external water delivery station are turned to OFF.
2. Turn the desired function ON by selecting the appropriate flip valve as labelled.
3. When filling the foam marker tank, ensure that the foam marker tank is vented.
4. When the required amount of water has been transferred, turn the appropriate flip valve to OFF.
5. When all functions have been performed, turn the external water delivery system OFF.

Rinse Water Tank Fill

The rinse water tank holds approximately 180 litres (3000 L) down to 100 litres (1500-2500 L). Make sure this tank always has sufficient water in it in case a chemical accident occurs and rinse water is needed to wash chemical from any contaminated persons, clothing or components.

RINSE TANK FILL PROCEDURE

1. Start by ensuring that all ball valves on the fill station are turned off.
2. Lift the 'Rinse tank fill' red handle on the EZ control 3-way ball valve to the vertical position. This is the ON position.
3. Connect the fresh water fill hose to the to the 3" fill cam lock coupling.
4. Operate the fresh water pumping system (make sure pressure does not exceed 75 PSI). There should now be flow transferring to the rinse water tank.
5. When the required amount of water has been transferred to the rinse water tank, stop the flow by turning off the external water supply and shut the rinse water tank fill valve by flipping it back down.

Agitation

TO AGITATE WHILE STATIONARY

1. Add 20 percent of the main tank's volume in fresh water to the main tank.
2. Add all chemicals.
3. Add the remaining quantity of water required.
4. Turn the agitator on with the pump at operating speed.

NOTE: Check that the super mix agitator is working; there should be a visible circulation of water near the back of the tank near the agitator.

5. If the tank has been filled and the spray mixture has been allowed to settle, agitate for as long as it takes the pump to pump the quantity of water in the tank. For example: with 3000 litres in the tank with a 170 L/min pump agitate for $3000/170 = 18$ minutes.

TO AGITATE WHILE SPRAYING

Have the bypass ball valve and agitator ball valves OPEN.

NOTE: The bypass ball valve must be open while spraying.

Auto Rate Control - Spray Application

After completing the filling process, you are now ready to start spraying. While travelling from the fill station to the field, the pump should be running at 400 - 500 rpm with the agitator running in order to ensure that the chemical mix is adequately agitated prior to spraying.

NOTE: The following information is provided as a guide only. It is the responsibility of the operator to assess the conditions in the field where the spray application is taking place

NOTE: The bypass ball valve must be open while spraying.

1. Enter the field, unfold boom and set the boom to desired height above the target and have pump running.
2. Switch on the console and set to run in self test mode (while stationary). Information on running in self test mode can be found in the Raven operator's manual supplied.
3. Turn on all boom sections
4. Remain stationary until all boom lines have been completely purged with product from the main tank.
5. Switch off all boom sections.
6. Commence travel on primary swathe and engage boom master switch. Auto rate controller will now control application based on the calibration information entered by the operator.
7. To avoid overlap it is recommended that individual boom section switches are used to turn on/off sections as needed.

8. Upon completing the spray task, the booms and pump should be flushed after spraying. See 'Flushing' section later in this chapter.

Auto Rate Control - Raven SCS 450



The Raven SCS 450 Auto Section Controller

- Simple operation
- Low-limit function
- Digital boom pressure read-out
- Supports a variety of flow meters and control valves
- Audible alarms
- Self-test function
- Rate bump features

For more information please see your Raven operation manual.

NOTE: The Raven SCS 450 controller is standard fitment on 3000 L models and optional on 1500-2500 L models.

Manual Rate Control - Spray Application

After completing the filling process, you are now ready to start spraying. While travelling from the fill station to the field, the pump should be running at 400 - 500 rpm with the agitator running in order to ensure that the chemical mix is adequately agitated prior to spraying.

NOTE: The following information is provided as a guide only. It is the responsibility of the operator to assess the conditions in the field where the spray application is taking place

NOTE: The bypass ball valve must be open while spraying.

1. Enter the field, unfold boom and set the boom to desired height above the target and have pump running.
2. Flip all boom section switches ON.
3. Flip master switch ON.
4. Remain stationary until all boom lines have been completely purged with product from the main tank.
5. Flip master switch OFF.
6. Commence travel on primary swathe and flip master switch ON to start spraying. Maintain a constant application rate by adjusting speed and flow rate to balance each other out as calculated in Chapter 6 'Calibration'.
7. To avoid overlap it is recommended that individual boom section switches are used to turn on/off sections as needed.
8. Upon completing the spray task, flip master switch OFF.
9. The booms and pump should be flushed after spraying. See 'Flushing' section later in this chapter.

Manual Rate Control - Spray Controls

IN-CAB SECTION CONTROL WITH ELECTRIC PRESSURE REGULATION

The 1500-2500 L sprayers come fitted standard with a simple electronic control box for spray control. It allows for on/off control of individual boom sections via the individual switches, or on/off control of all boom sections simultaneously via the master switch. The pressure regulation is electrically controlled via the control box too with an increase/decrease switch.

It is important that the console is mounted in the cabin in such a way that it cannot become a projectile in the event of sudden braking or an accident or if the sprayer is disconnected from the towing vehicle. The two bolts at the base of the control box are designed to provide adequate mounting to a bracket within the cabin. The master switch controls all boom valves simultaneously and the individual boom switches provide independent control of the boom valves.

Connect the two 7-pin trailer plugs together in order to be able to control the boom valves.

Connect the battery wires directly to a 12V battery. Do not connect to any other voltage line. Attach the red wire (positive) to the positive terminal and the black wire (negative) to the negative terminal. Secure the battery wires with plastic cable ties.

Do not tie the battery wires close to the existing battery leads or any other electrical wiring. If using two 12V batteries e.g. two batteries in parallel, it is best to utilize the power as supplied by both batteries. Connect to positive terminal on battery supplying starter motor and negative terminal on other battery. Otherwise it is best to alternate the battery being used each day so that one battery is not drained completely flat.

The pressure regulating valve is used to alter the maximum spray delivery pressure. Screw in the pressure regulating valve (turn clockwise) to increase the delivery pressure. Unscrew the pressure regulating valve (turn counter clockwise) to decrease the delivery pressure. The pressure regulating valve can also be used as a pressure relief valve if an alternate method of controlling the pressure is used. In this capacity, the relief valve provides relief when the pressure exceeds a pre-determined value.

If the regulating valve is used in this manner, it must be set so that the pressure can not exceed 690 kPa (100 PSI). This is a Goldacres factory preset.

To check or alter this setting, turn the pump off and unscrew the valve right out.

With all solenoids off, or any boom supply valves, close all control manifold ball valves so that all flow passes through the relief valve.

Run the pump at maximum operating speed (540 PTO RPM) and slowly screw the relief valve in until the desired pressure is achieved (690 kPa). Tighten the nuts on the adjusting stem so that this setting is maintained. If the relief setting is too low, it causes too much flow to bypass back to the tank and it will limit the maximum obtainable pressure.



Above: In cab section control and pressure regulation control box and harness.

Suction Filter Cleaning

The suction filter tap is plumbed before the filter housing. The suction filter receives fluid from either the rinse water tank or the main spray tank. Therefore, all fluid to be sprayed or flushed through the system passes through this filter.

NOTE: Running the main spray pump dry will damage it. The main spray pump must be OFF when switching from main spray tank to rinse water tank and vice versa.

Filter Removal

For information specific to your circumstances, the spraying equipment being used and the chemicals being applied, consult your agronomist or chemical supplier.

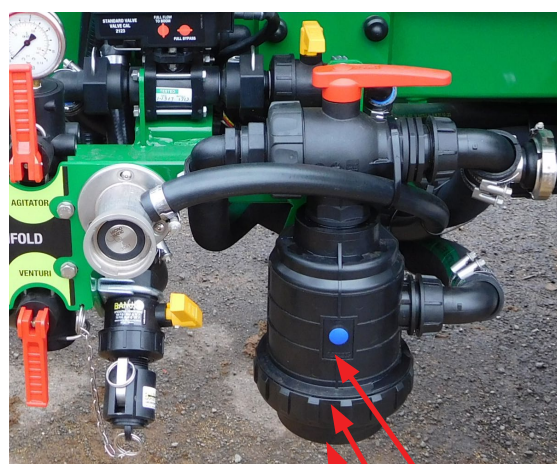
WARNING: Always wear the recommended personal protective equipment and use caution while working with chemicals.

To remove the suction filter bowl, follow the steps below.

NOTE: A quantity of fresh water will need to be in the rinse tank.

1. Set the tap handle in the OFF position.
2. Loosen the nut holding the filter bowl slowly. Take care as some chemical may dribble out.
3. Suction on the filter bowl can be relieved by briefly OPENING the tap for about 2 seconds and then off again. This will cause the filter bowl to drop and become loose. Stand clear of bowl and be sure to catch any chemical coming out in a suitable container.
4. Once chemical has stopped coming out of the filter, unscrew the nut fully to remove the filter bowl. Be careful when removing the bowl as there may still be some chemical in it.
5. Clean the screen and the O-rings, then refit and ensure that O-rings are in place.

Below: The suction filter is mounted to the left hand side of the sprayer.



Pressure Filter Cleaning

There are 2 in-line pressure filters in the spray pressure line that traps the minute particles that are not collected by the main suction filters.

WARNING: Always wear the recommended personal protective equipment and use caution while working with chemicals.

Unscrew the filter body. It may be necessary to use the pressure filter tool (GA4522610). Allow the chemical in the filter to dribble out into a suitable container to avoid environmental contamination and avoid personal contact. Clean or replace the filter screen with the same mesh size as necessary and then refit the filter body.



Above: Dual in-line pressure filters located on left hand side chassis rail next to the induction hopper mount.

Flushing

The following information is provided as a general guide for flushing your sprayer following a spray application.

For more specific information regarding flushing, and decontamination, specific to the products that you are applying, it is recommended that you consult the chemical label or your chemical supplier.

To use the flush water tank to flush pump & boom only:

1. Turn pump off.
2. Turn 3 way ball valve to draw from flush water tank rather than main product tank.
3. Set Raven console into manual mode.
4. Switch all boom sections to ON.
5. Hold increase button for 15-20 secs. This will ensure that fast close valve is fully open to direct all flow to booms (This will eliminate bypass from the booms to main tank).
6. Turn pump ON. The pump will now draw water from the flush water tank and direct all flow to the booms.
7. Keep boom switches on until the contents of the flush water tank has been run through the booms.

NOTE: If the pressure gauge increases dramatically, slow down pump RPM.

To flush entire system (pump, boom & tank):

1. Drain the main tank.
2. Connect to external water source (to provide fresh water supply).
3. Turn main tank fill tap OFF to direct external water supply to the fill manifold under pressure.
4. Engage tank rinse nozzles with the lever on EZ control and allow rinsate to drain out through the main tank drain.
5. Close main tank drain.
6. Add a quantity of fresh water (a minimum of approximately twice the pumps capacity) to the main tank (as per instructions under filling).
7. Turn on pump with agitator and bypass open to allow fresh water to circulate.
8. Turn off all taps to allow the pressure relief valve to blow off and purge the "relief to tank" line.
9. Operate induction equipment (if fitted), with a quantity of fresh water in order to flush venturi system.
10. Once complete drain chemical induction hopper delivery hose externally.
11. Now follow the instructions for boom flushing as above - keep ball valve drawing from main tank.

Decontamination

Decontamination of your spraying equipment is important when changing chemicals or application methods.

Information specific to your circumstances, the spraying equipment being used and the chemicals being applied should be provided by your agronomist or chemical supplier.

Always wear the recommended personal protective equipment and use caution while working with chemicals.

BASIC DECONTAMINATION WITH OPTIONAL INDUCTION HOPPER

1. Fill the main spray tank with approximately 1000 L of fresh water.
2. Lower the induction hopper and put the appropriate amount of decontaminating agent into it.
3. Turn on the agitation jet on the hopper and allow it to fill the hopper to the top. Once full, turn the jet off and leave the hopper to sit for a few minutes. This is to ensure that the decontaminating agent fully neutralises any of the chemicals that were in the hopper.
4. Use the venturi to induct the contents of the hopper into the main spray tank.
5. Recirculate the decontaminating agent through the system while the main tank rinse nozzles are running (pressure supplied from the main spray pump e.g. pressure delivery manifold).

6. Turn off all taps to allow the pressure relief valve to blow off and purge the 'relief to tank' line.
7. Operate induction equipment (if fitted), with a quantity of fresh water in order to flush venturi system.
8. Once complete, drain chemical induction hopper delivery hose externally.

NOTE: Lower the hopper and open the lid to allow it to drain completely.

9. Turn on boom recirculation to flush all boom lines back to main tank.
10. Once the main tank has emptied, flush the system again using fresh water to ensure the decontaminating agent is removed from the system.
11. Once the main tank is empty, the hose between the tank and the suction filter also needs to be drained. Close the valve on the Suction Filter.
12. Remove the suction filter bowl and clean as per 'Suction Filter Cleaning' instructions earlier in this chapter.
13. Return switch to main chemical tank. Stand clear of the filter when turning the valve to main chemical tank as chemical will be coming out. Catch all of the chemical in a suitable container so it can be disposed of in the correct manner.

Sprayer Transportation

1. Make sure the tractor has sufficient towing and braking capacity to tow the sprayer.
2. All relevant transport regulations must be adhered to when transporting the sprayer: (ie: speed regulations, oversize signs, flashing light, etc.) It is the operator's responsibility to know the relevant regulations.
3. Make sure the sprayer is securely hitched to the tractor.
4. Ensure that the boom is securely supported when travelling and that the isolation ball valves on the hydraulic lift cylinders are closed.
5. Where a road pack has been installed connect tail light plug.

CAUTION: Take care when reversing with the sprayer attached. If driver visibility is restricted, use another adult with a clear view to the rear of the sprayer to give reversing directions.

CAUTION: It is the operator's responsibility to know the tare weight and gross weight of the sprayer. If any alterations are made to the sprayer, it is the operator's responsibility to know the tare weight and the gross weight of the modified sprayer at all times.

End of Day

At the end of the spraying day: Follow the flushing and decontamination procedure as per previous instructions.

1. Unfold the boom in an area convenient to dispose of residual chemical (an area where chemical can not run-off into above ground or sub surface water courses).
2. Clean all filters.
3. Clean all nozzles.
4. Wash down unit
5. Drain main tank

CAUTION: If the sprayer is left attached to the tractor when parking the sprayer; make sure the tractor park brake is applied, the engine turned off and the sprayer is securely hitched to the tractor:

If the sprayer is to be disconnected from the tractor:

1. Ensure the main tank and any other tanks are empty.
2. Lower the jack and wind up until weight is taken off tractor:

3. Remove drawbar pin.
4. Remove safety chains.
5. Disconnect all drawbar connections between the sprayer and the tractor (i.e. tail lights, foam marker lines, electric controls etc.)
6. Where fitted, remove the PTO shaft from both the sprayer and the tractor:
7. Protect hydraulic hoses and electrical connections.

NOTE: Store the sprayer in a suitable location to prevent freezing. If the sprayer is to be left where freezing may occur; cover the pump and flow meter with a material bag and empty pump and flow meter of all water (run the pump dry for 15-20 seconds). It is also suggested that a small quantity of anti freeze be added to the main tank and circulated through the sprayer to minimise the chance of freezing.

IMPORTANT: Make sure any ice has thawed before using sprayer.

End of Program

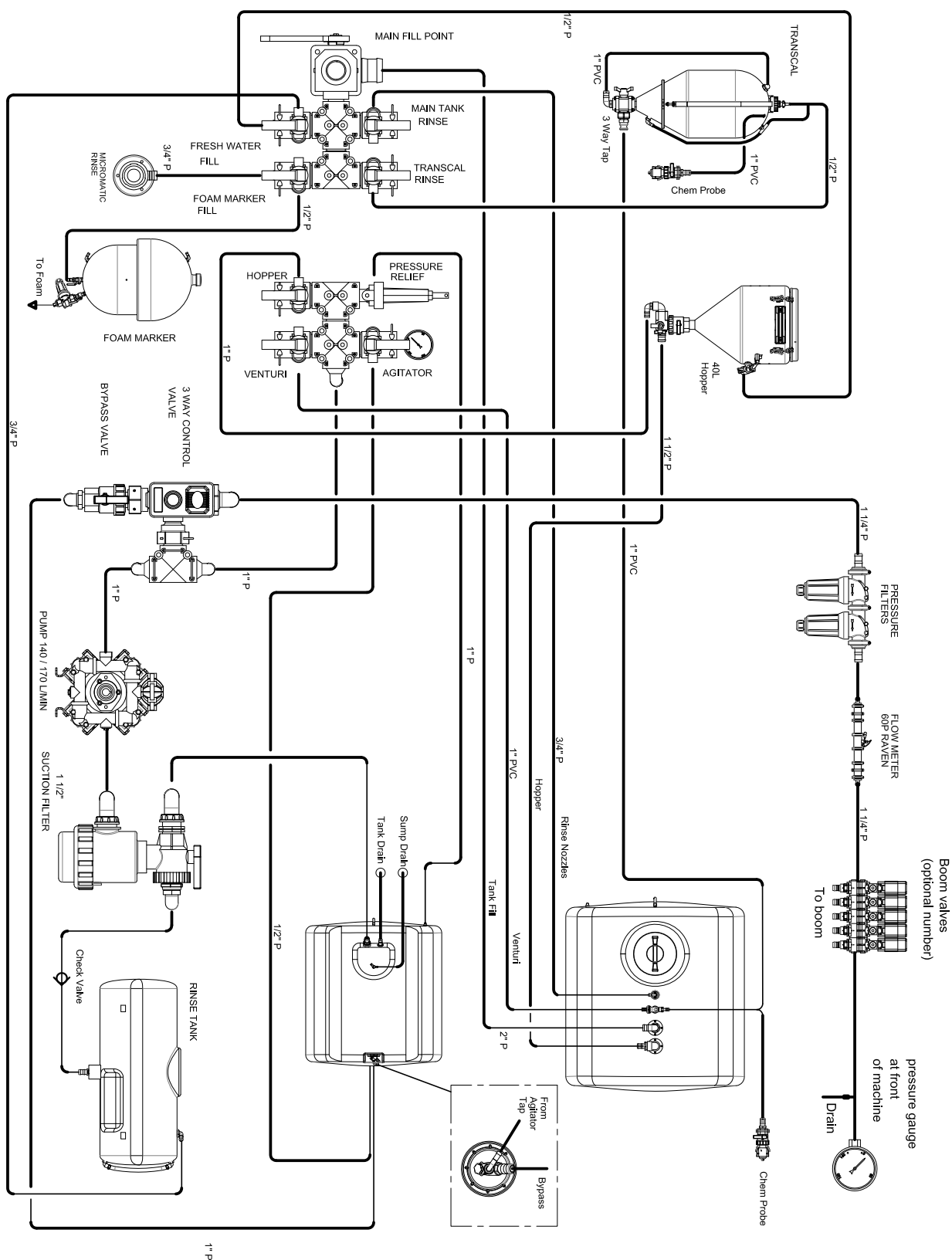
If the sprayer is to be stored for a long period of time without use, there are several tasks that need to be performed.

- Clean the sprayer thoroughly as described under 'End of Day' tasks.
- With the sprayer attached to the towing vehicle, carry out a thorough observation to determine if there is any damage to the sprayer.
- Park the sprayer in a position where it will not be affected by frosts, and preferably out of direct sunlight.
- Ensure the main tank and any other tanks fitted are empty.
- Lower the jack and wind until weight is taken off tractor:
- Remove drawbar pin.
- Remove safety chains.

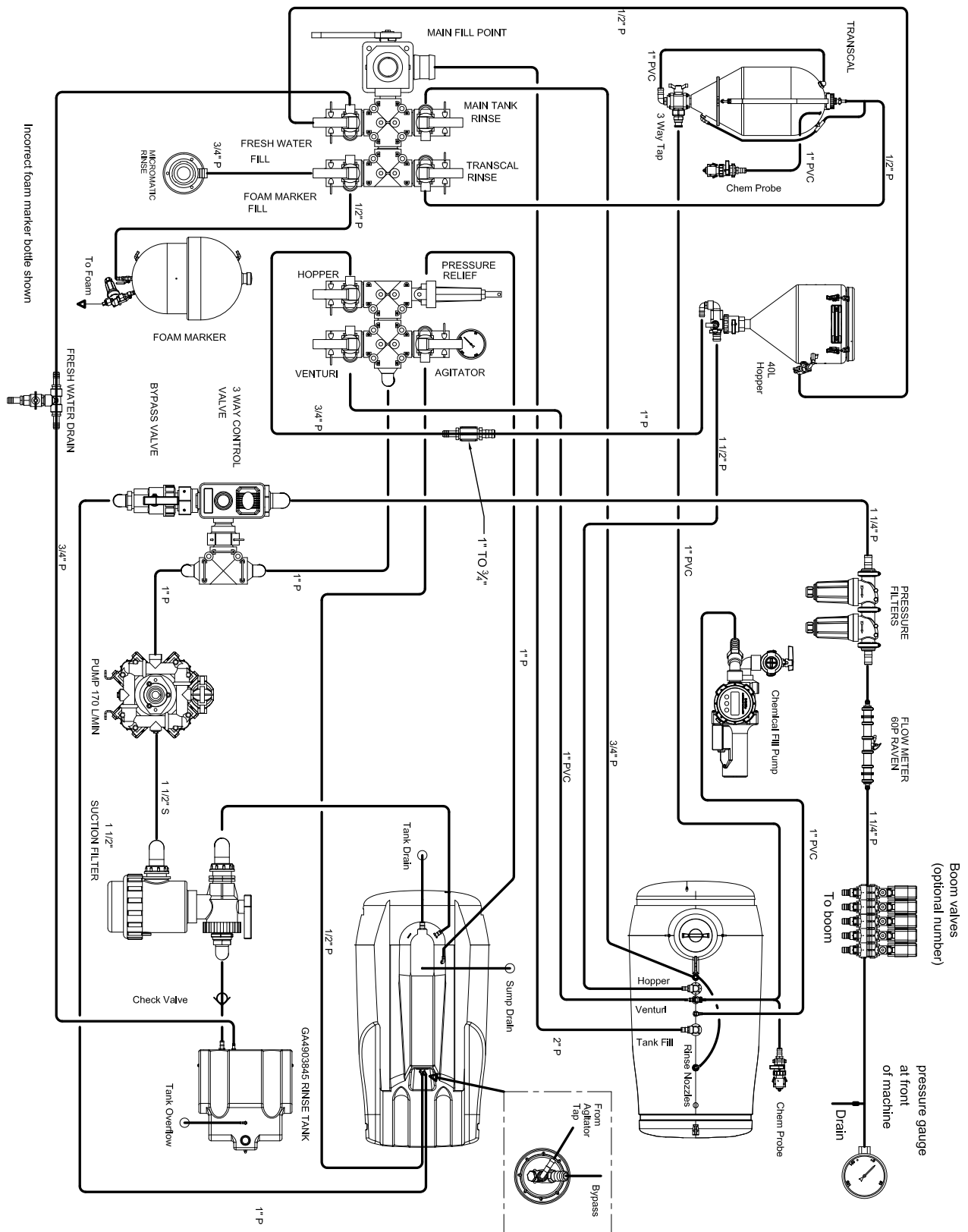
- Disconnect all drawbar connections between the sprayer and the tractor (i.e. tail lights, foam marker lines, electric controls etc.)
- Where fitted, remove the PTO shaft from both the sprayer and the tractor and store with the sprayer.

If necessary, remove consoles from cabin and store in a safe and secure location. Protect hydraulic hoses and electrical connections.

Plumbing Schematic - I 500-2500L



Plumbing Schematic - 3000L



Chapter 9

DELTA BOOM

General

All booms present a number of safety hazards due to their operation - the operator should read and fully understand the safety instructions in this manual prior to operation.

Delta booms (12-24 m) have been designed and built to ensure many years of trouble free service. Aluminium outer boom sections reduce the overall weight of the boom and aid in providing a superior boom ride and longevity.

CAUTION: Goldacres do not endorse use of this machine for spraying at speeds greater than 20 Km/hr.

CAUTION: Before adjusting the boom alignment, the hydraulic fold circuit must be free of air. Hydraulic circuits that contain air can make the boom appear that it is too far forward. Adjustment of the boom without "bleeding" the hydraulic circuit first will result in a boom that quickly reverts to hanging out of alignment to the back.

CAUTION: All chemicals have corrosive properties to some degree. Prevent damage to the machine by always consulting the chemical MSDS or the chemical supplier for advice concerning the corrosive properties of the chemical. It is the responsibility of the operator to carry out preventative and ongoing maintenance to the machine, particularly while applying chemicals with highly corrosive properties. Machine components should be coated

with a suitable protectant prior to use, and then washed down, thoroughly, immediately after every application. Consult the supplier of the substance if you require specific advice about the effectiveness of any particular protectant to prevent premature degradation of machine components.

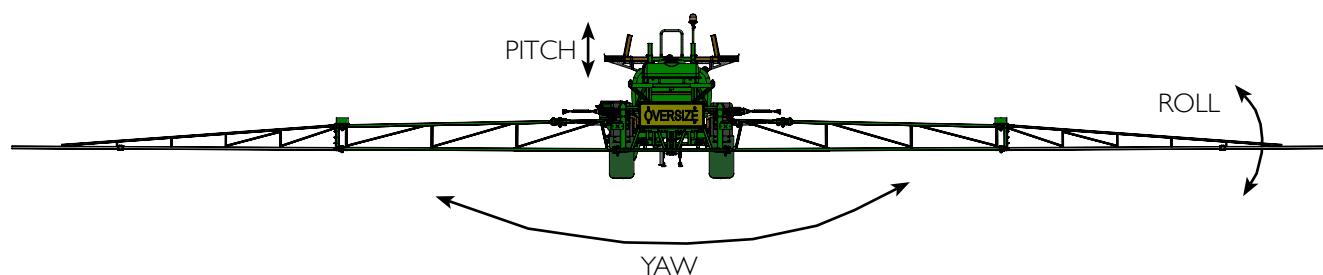
Delta booms feature a unique (patented) boom suspension system.

This system provides suspension in three directions:

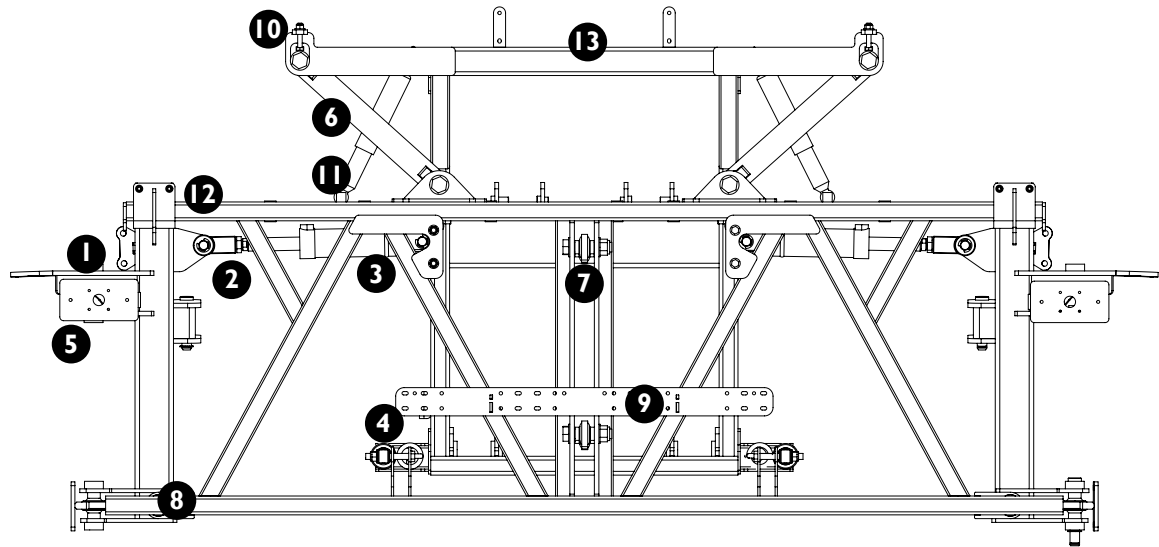
PITCH Hydraulic cylinders connected to nitrogen filled accumulators dampen the vertical boom movement encountered over rough ground conditions.

ROLL Shock absorbers help maintain constant boom height over sloping and uneven ground.

YAW Shock absorbers and springs overcome any erratic whipping movement, which creates undue stress on the boom frame and might otherwise cause uneven spray application.

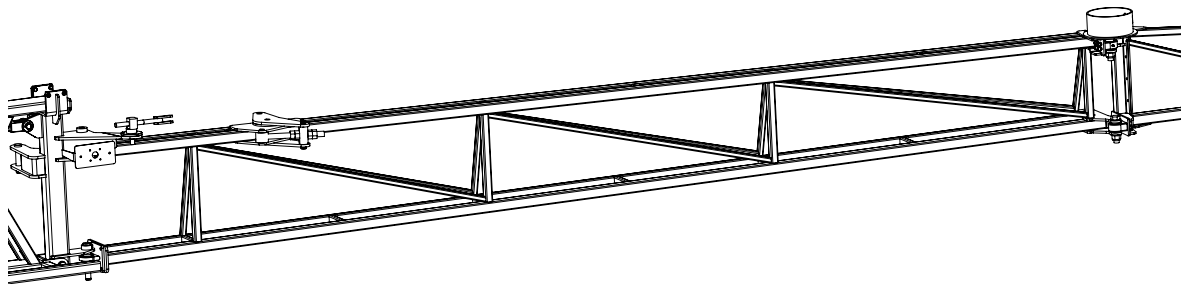


Delta Boom Overview

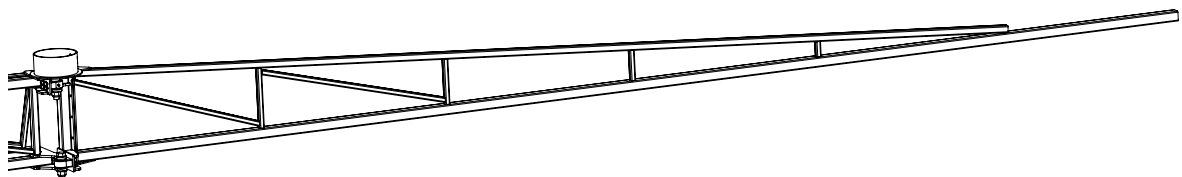


NO.	FEATURE
1.	Boom rose end
2.	Tilt arm adjuster
3.	Tilt cylinder (optional)
4.	Yaw spring (or cylinder) mount
5.	Tail light mounting plate
6.	Diagonal delta links
7.	Lineal delta links

NO.	FEATURE
8.	Tilt pin (40 mm)
9.	Boom section controls
10.	Boom alignment adjuster
11.	Roll shocker
12.	Tilt arm wear strips
13.	Flow meter



Inner Wing



Outer Wing

Delta Boom Features

Centre Section

The Delta centre section is made up of two components, the Paralift rear and the boom centre section. The two are held together by 4 delta links. These links allow the boom to be suspended in order to provide roll and yaw suspension.

Roll suspension acts when the boom pitches up and down at the tips. Yaw suspension acts when the boom moves fore and aft at the tips. If the boom did not feature yaw suspension there would be excessive stresses exerted on the booms and centre section when cornering or corrections of line are made. The yaw suspension allows the chassis of the sprayer to move left and right without any movement being transferred to the boom. The Paralift rear will move with the centre of the sprayer but the boom centre section will remain static or level as it rotates around the delta links connecting it to the Paralift rear.

The boom yaw is dampened by a combination of springs and dampers. If the springs are not tensioned correctly the boom will be able to yaw excessively and the springs may be damaged. If a spring is damaged, both opposing springs must be replaced at the same time.

Hydraulic Raise & Lower

The Paralift on a Delta boom enables the boom to be raised and lowered to maintain a consistent boom height above the target.

Delta booms feature a Paralift rear which uses two hydraulic cylinders to perform the lift, while also acting as a component in the vertical suspension system. Each hydraulic cylinder is connected to an individual nitrogen charged accumulator which smooths out the boom ride. The boom limit height switch allows the operator to adjust the minimum ride height of the boom.

The hydraulic lift also enables the boom to be raised prior to folding and then used to lower the boom onto the boom rests once folded in.

Hydraulic Fold

The hydraulic fold feature allows the boom to be opened and closed from within the cabin.

Hydraulic phasing cylinders are used in the folding operation of the boom. This ensures that both sides of the boom are synchronised and will open and

close together so that the weight distribution is the same on both sides of the boom.

As hydraulic fluid enters one hydraulic cylinder, it acts upon the first ram and causes it to move. This motion results in an amount of fluid entering the second hydraulic cylinder which causes it to move an equivalent distance. There is also a flow restrictor for each cylinder so that the hydraulic fluid will enter and leave the respective cylinders at a controlled rate. This has the effect of slowing down the rate of fluid transfer and thus causes the boom to open and close more slowly - protecting the boom from damage. If the phasing cylinders do not fold together, information on re-phasing the rams can be found in Chapter 11 'Troubleshooting'.

Boom Balance

The Delta boom suspension system causes the boom to adopt the same plane as the spray tanker. If one side is heavier than the other, the boom will tend to hang lower on the heavy side, so both sides need to be balanced for the boom ends to sit at the same height.

To achieve this, a boom counterweight can be included on the boom and placed strategically so that it compensates for the opposite end and balances the boom. The different sized counterweights can be used and/or moved to help balance the boom correctly.

Boom Cables

Boom cables are a critical part of the Delta boom and it is important to ensure that boom cables are correctly adjusted prior to operation.

Loose boom cables can cause boom damage by allowing the outer boom section to hang out of alignment or to 'break away' too easily. This can shorten the sprayers life by placing unnecessary stresses on the boom, Paralift and chassis.

The cable tension can be checked by inspecting the cable springs, further information on boom adjustment and alignment can be found in the 'Boom adjustment' section.

Continued over page

Delta Boom Features

Boom Valves

Motorised boom valves are fitted as standard and are mounted on the boom centre section at the rear of the sprayer. Motorised boom valves feature a 12 volt motor that opens or closes a stainless steel plunger, which in turn opens or closes flow to the boom sections as required.

In the event of valve failure, unscrew the top cap and check the fuse (3A) is not blown as a first step.

Nozzles

The standard nozzle spacing on Goldacres booms is 500 mm. Nozzles are mounted on brackets that are adjustable for different nozzle types. Nozzles are mounted so that they are protected from ground hits should the boom make contact with the ground, obstructions or crop.

Three Dimensional Breakaway

Delta booms from 24 metre width and all TriTech booms feature the unique three dimensional breakaway hinge which allows the tip to “break” forward, backward and upward if an obstruction is hit. The 3D breakaway hinge aims to eliminate any further damage to the remainder of the boom should an obstruction be hit.

It is important that the 3D Breakaway hinge is properly adjusted when in operation. Adjustment instructions can be found later in this chapter.

Boom Protection Brackets

Stainless steel boom protectors are fitted on the boom to protect the boom when resting on the boom rests for transport. It is important to ensure that the boom protection brackets are fitted correctly.

Boom End Protector

Boom end protectors are fitted to the 24 metre breakaway tips to help prevent damage to the boom from ground strike or from hitting an obstruction. They also help to keep the boom from becoming entangled when spraying close to fence lines.

Delta Boom Options

Hydraulic Boom Wing Tilts

Delta booms can incorporate a hydraulic tilt option, which allows the individual boom sides to be raised independently when in the working position. This serves to provide greater variability of boom height control to compensate for undulating ground conditions. Boom tilts are operated from a lever or switch in the tractor cabin depending on hydraulic system fitted.

The use of tilt cylinders should be kept to a minimum as the tilt operation affects the balance of the boom causing rocking of the whole boom assembly.

Where hydraulic tilts are not fitted, a manually adjustable link is placed in substitute for the tilt cylinder:

Fence Line Jets

Manually operated fence line jets are optional on these sprayers. The 'fenceline' jet is designed to enable the operator to spray right up to the boundary fence without having the boom too close to the fence.

This should prevent operators from putting the boom into the fence, especially important when the boom is relatively new and the operator is not familiar with the width of the boom. The fenceline jet should be turned off after the end of the first lap.

Delta Boom Operation

Folding Operation

FOLDING PROCEDURE:

1. Starting with the boom in the working position, use the lever/switch in cabin to raise the boom fully.
2. Use the lever/switch to fold the boom completely in.
3. Lower the boom until the boom just touches the rests
4. Then continue to lower the boom a further 100 mm so as to put sufficient weight onto the rests. The rests need to be positioned high enough to allow the boom to lower 100 mm without the boom resting on the tyres or mudguards.

UNFOLDING PROCEDURE:

The boom unfold sequence is as below:

1. Raise the boom fully to clear the boom rests.
2. Use the lever/switch in cabin to unfold the boom so that the boom is aligned with the centre section.
3. Lower the boom to the desired height above the target.

DANGER: Always check for power lines while folding and unfolding the boom, as contact with lines can be fatal.

NOTE: Booms must not be folded, or unfolded, while the sprayer is moving. When the boom is between fully open and fully closed, there can be large stresses placed on many boom components. If the sprayer is moving and hits a bump, severe damage to the boom can occur.

NOTE: The booms must be folded continuously without stopping and starting during the sequence. Take care not to fold/unfold booms too fast, as damage can be caused.

NOTE: To make the boom fold cylinders extend or compress equally on both sides, continue holding the 'Boom Fold' OUT button or lever once the boom has fully unfolded or hold 'Boom Fold' IN button or lever once the boom has fully folded for a few extra seconds.

Delta Boom Adjustment

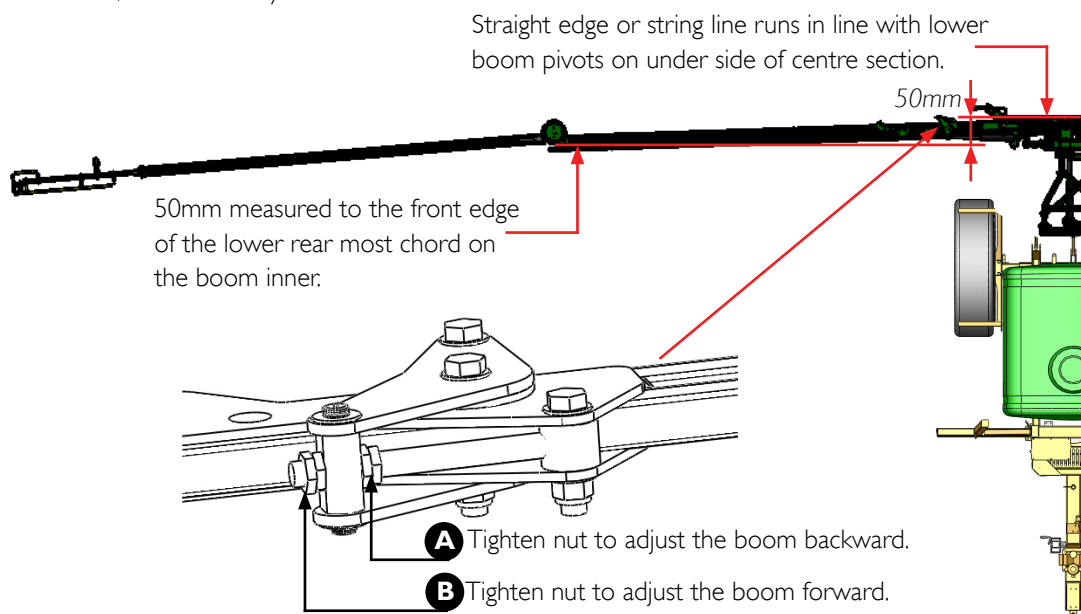
Inner Steel Boom Alignment - Unfolded Position

1. Open the boom fully into the working position.
2. Continue to press the unfold button or hold the hydraulic remote open to ensure the fold cylinders are phased completely. They must be at the same length.
3. Look along the inner booms between the cable drums to assess the alignment.

All booms must be 50 mm forward of the centre section at the cable drums. A string line can also be used for measuring the lead of the inner boom (see below).

4. If adjustment is required, loosen the two lock-nuts on the boom fold adjuster bolt at the rear of the boom.
5. To adjust the boom forward, tighten the outer adjuster nut. To adjust the boom rearward, tighten the inner adjuster nut.
6. When the boom is in the required position, tighten both locknuts to hold in place.
7. Follow this process for both inner booms.

NOTE: It is important that both wings are adjusted the same. If one wing is adjusted further forward or back than the other, the boom may not sit level.



Delta Boom Adjustment

Outer Boom Wing Alignment - Unfolded Position

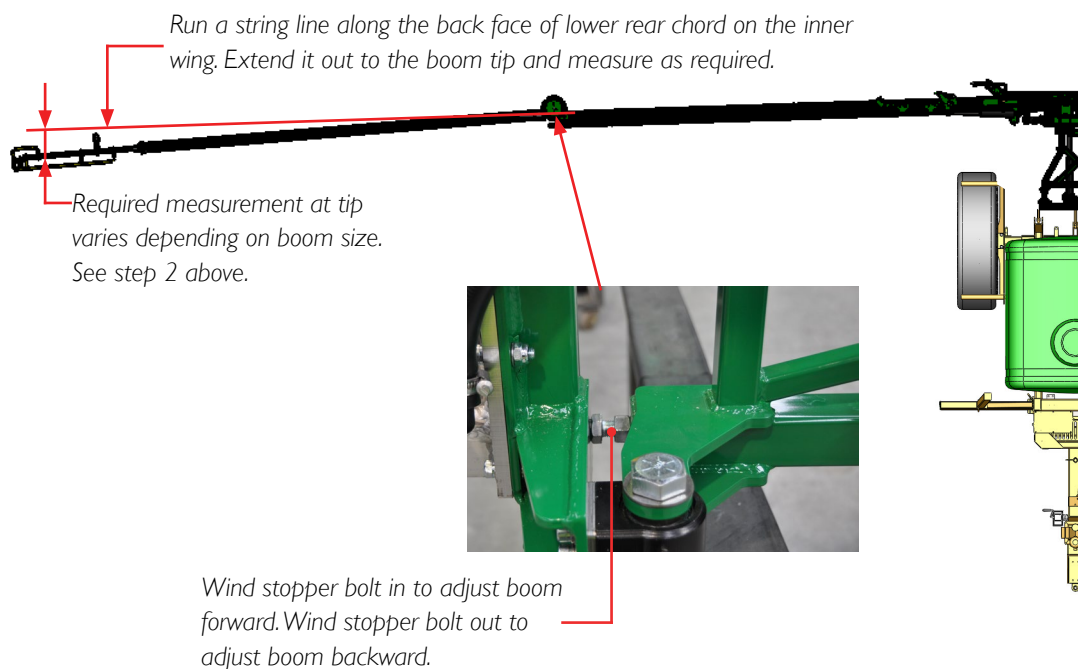
1. When adjustment of the inner booms is complete, the outer booms can be aligned.
2. Outer booms must be 30-50 mm forward of the inner booms. Use a string line to assist with achieving the correct measurements.
3. To align the outer booms, the cable adjusters and boom stopper bolt are used. To pull the outer boom forward, wind in the boom stopper bolt. The turnbuckle that is connected to the cable damper springs at the front of the boom must also be shortened to maintain cable tension. At the same time the rear turnbuckle must be lengthened.
4. To adjust the outer boom rearward, wind out the boom stopper bolt. The rear turnbuckle must be shortened and the turnbuckle at the front lengthened.
5. Once correct alignment has been achieved the cable spring tension needs to be set so there is a 3 mm gap between each coil.

NOTE: It is advised that all threads are lubricated prior to making adjustments.

NOTE: If cable adjustments run out on the turnbuckles, it is advised that you should contact your dealer and purchase new cables.

NOTE: It is important that both wings have the same adjustment. If one wing is adjusted further forward or back than the other, the boom may not sit level.

NOTE: The rear cable should be under tension.

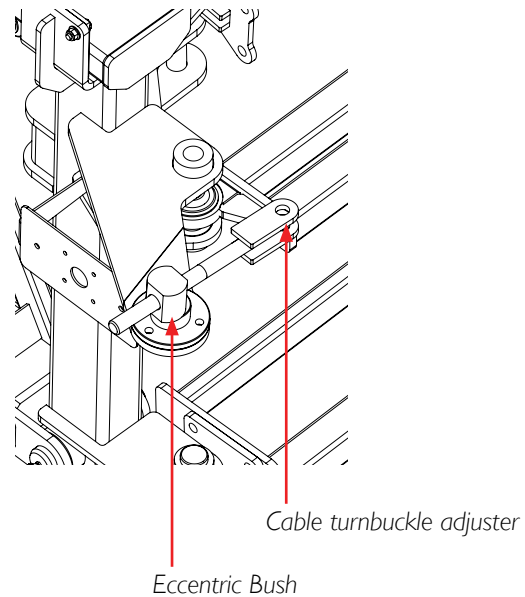


Delta Boom Adjustment

Outer Boom Wing Alignment - Folded Position

- The eyebolt cable adjuster aligns the outer boom arm in the working position; the adjustment plate is designed to adjust the outer boom arm in the folded position.
- The eyebolt adjuster will follow the same orientation as the boom when folding and unfolding. For example, when the boom is in the operating position the eyebolt adjuster should be horizontal in line with the boom. With the boom folded, the eyebolt adjuster should be pointing forward in a raised position, again following the line of the boom.
- Fold in the boom. If the outer boom arm does not come in all the way against the inner boom arm and contact the bump stop then the adjustment plate will need to be moved out. If the outer boom arm contacts the bump stop too early and places too much tension on the cable then the Eccentric Bush needs to be rotated to suit.
- To adjust the Eccentric Bush the boom has to be in the working position. Have someone pull back on the outer boom arm to release the tension on the cable whilst you make adjustments to the bush. Rotate the Eccentric Bush one set of holes for small adjustments. When adjustment is completed ensure the outer boom arm is released carefully so it does not spring forward dangerously. Re-adjust the cable eyebolt to realign the outer boom arm whilst still in the working position before folding the boom and re-checking the alignment in the folded position.
- Repeat the procedure if necessary until the outer boom arm assumes the correct alignment in both the working and folded positions. When this has been achieved tighten all bolts.
- Spring tension may be altered slightly when this bush is rotated. Check there is a 3 mm gap in the spring coils and adjust if required.

NOTE: If the outer boom arm contacts the bump stop too early and too much tension is placed on the cable, then the hydraulic cylinder may fail to bring both arms all the way in, or damage the boom arms and cable.



Delta Boom Adjustment

Vertical Boom Alignment - Unfolded Position

When the boom is in the working position, the inner and outer boom should be level or slightly increasing in height from the centre section to give a consistent and even spray application height. A new boom may be susceptible to stretching or sagging as the components are worn in. Several adjustment may be required in the first 12 months of operation until the boom settles.

INNER BOOMS

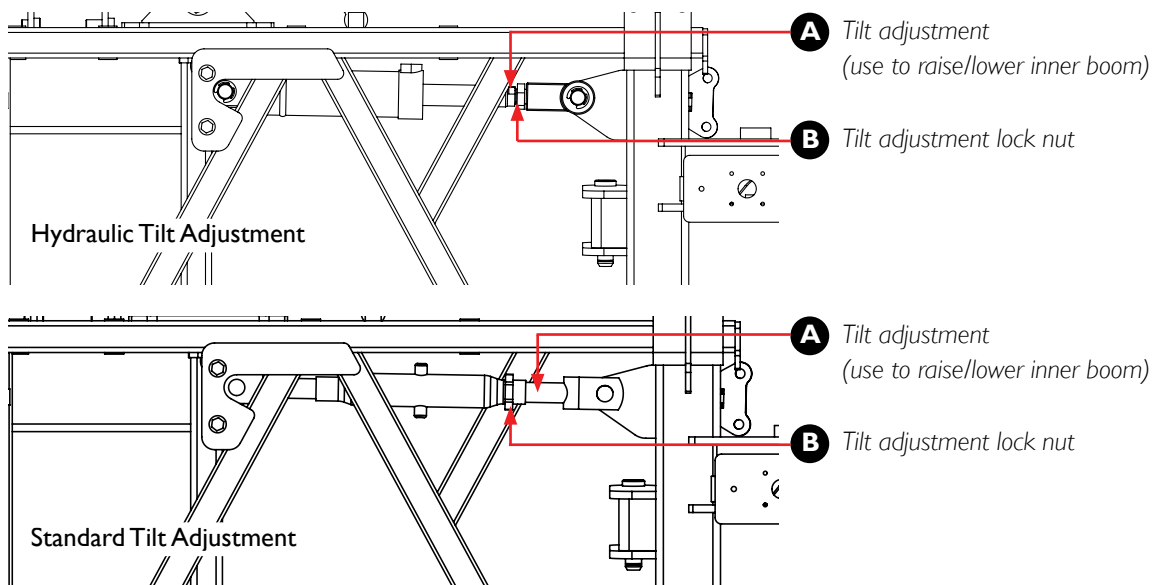
- The boom centre section must be level with the chassis before any boom adjustments are made. The centre of the centre section should line up with the centre of the Paralift when look from the rear. This can be done by either shortening or lengthening the centre section adjuster bolt at the top delta links, or by adding weight discs to the cable drums.
- The inner booms must be adjusted first so they are the same height as the centre section or slightly increasing in height from the centre section (to allow for boom stretch) .These adjustments are made by lengthening or shortening the tilt adjusters on the tilt cylinder.
- To lengthen or shorten the tilt adjusters, the weight of both the booms will need to be supported.
- When any adjustments are completed. Ensure the lock nuts are tight.

OUTER BOOMS

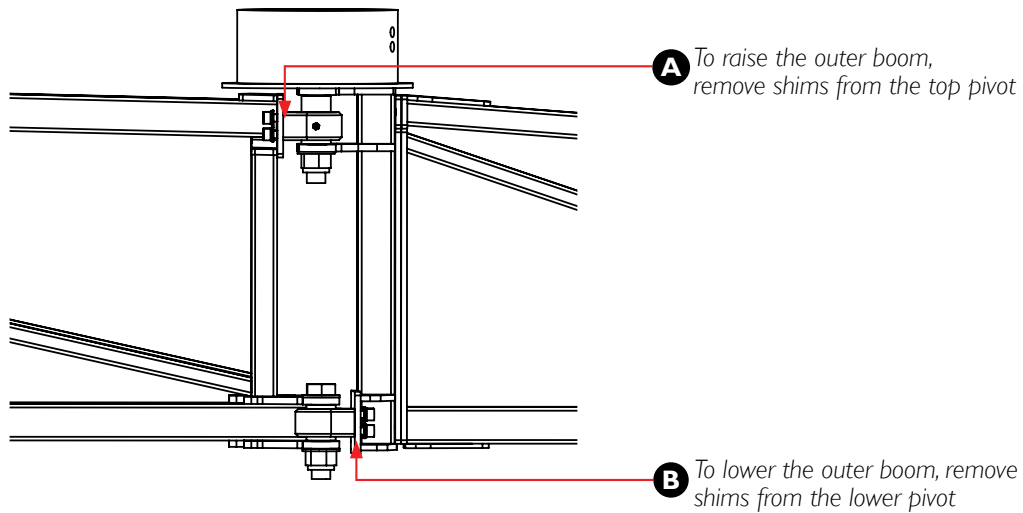
- The height of the outer booms in the working position are adjusted by adding or removing shims at the cable drum.
- The cable drum mounts are assembled in manufacturing with 6-7 shims at the upper and lower bearing blocks.
- If the outer boom hangs lower than the inner boom, remove shims from the upper mount until the booms are level. If the outer boom is too high remove shims from the lower bearing block. Retension the retaining bolts to 65 Nm when all adjustments are complete.
- The boom cables may need to be loosened to enable easier removal of the shims.

For 18-24 m booms:

1 shim added = 5-15 mm change at boom end

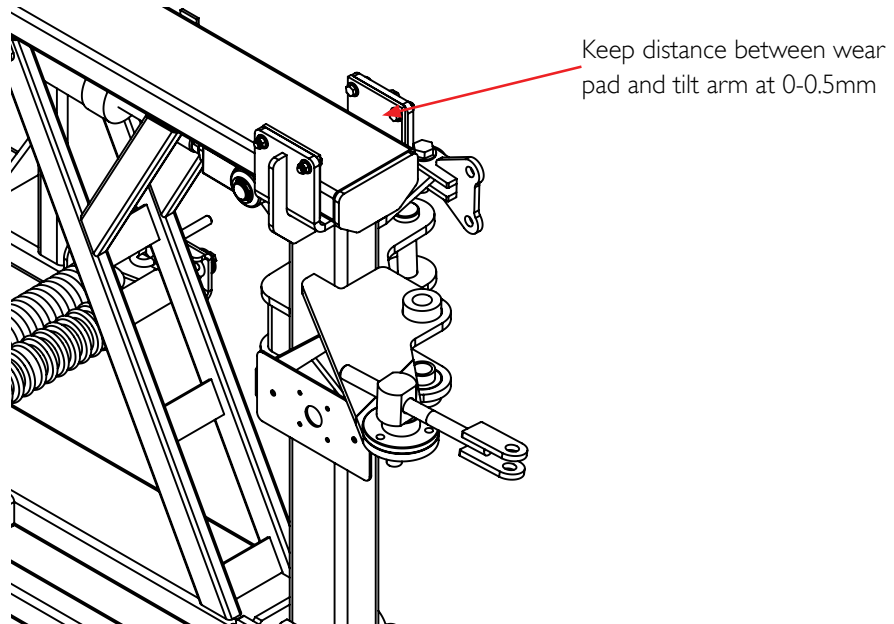


Delta Boom Adjustment



The tilt arm guide arms are fitted with wear strips. It is important that these strips are maintained and that the gap between them and the tilt arm is kept

between 0-0.5mm either side. This ensures the tilt arm cannot twist, prolonging the life of the product.



Delta Boom Adjustment

Vertical Boom Alignment - Folded Position

When the booms are folded up in the transport position, the full weight of the booms must be supported by the inner boom. The outer aluminium boom may sit on the boom rest rubber but must not support any weight.

INNER BOOMS

- If the boom sits level in the working position but when folded up, one side is lower than the other; there is one adjustment that can be made.
- Shims can be placed at the bottom boom mount of the lowest boom - refer to diagram A. This will lift the boom in the open position.
- If the boom is not level in the working position, the most likely cause is if this is an out of balance boom. Refer to previous boom adjust information.

NOTE: This process should not be required as once they are set in manufacturing, they should not change.

When the booms are folded up in the transport position, the outer boom must saddle onto the inner boom. If this alignment is out the outer boom will not saddle correctly and will not be supported in transport.

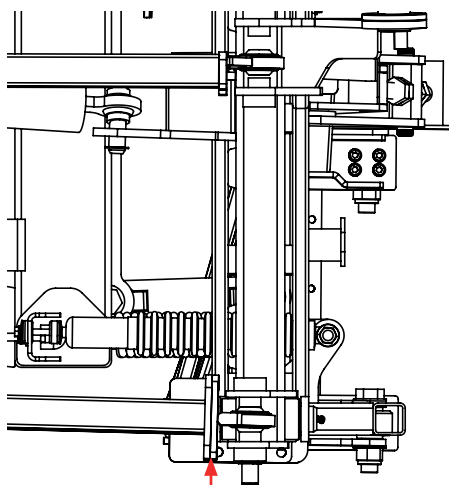


Diagram A

Place shims here

The boom support saddle is bolted to the outer boom and when folded, couples to the inner boom. This saddle must slide onto the inner boom freely to prevent damage to the booms.

NOTE: This process will be required in the first 6 months of operation as the booms stretch and wear in.

OUTER BOOMS

- If the outer boom hangs too low in the folded position shims must be added to the cable drum pivots. To raise the outer boom, add shims to both the upper and lower pivots. This adjusts the angle of the pivot axis causing the outer boom to fold up higher. By adding shims to both the upper and lower pivots, the outer boom height is not affected in the working position.
- To lower the outer boom in the folded position, remove shims from both the upper and lower pivots.
- 1 x 1 mm shim at the upper and lower pivots equals approximately 15mm change in height.

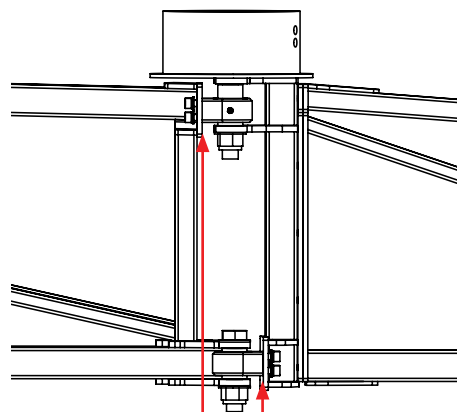


Diagram B

Place shims at both pivots

Delta - Three Dimensional Breakaway

Initial setup

1. Open the boom fully into the working position and lower to a good working height.
2. Close the ball valves on the two hydraulic lift cylinders for safety purposes.
3. The main hinge mounting plate must be a specific distance from the boom end plate. Measure from the centre of the closest retaining bolt to the boom end plate. This must measure 160 mm as shown in the diagram.
4. The bottom mounting plates must have a 4 mm gap between them. This can be adjusted by loosening the retaining bolts and sliding these plates to achieve the required gap.
5. The turnbuckle must now be adjusted. This determines the initial breakaway force required when an object is struck.

Measure from the top of the bottom boom chord to the centre of the pivot bolt 'A'.

Measure from the top of the bottom cord to the centre of pivot point 'B'.

Subtract measurement 'A' from measurement 'B'.

This must be 17-18 mm. If this is less than 17 mm, shorten the turnbuckle. If it is greater than 18 mm the turnbuckle must be lengthened.

6. The spring tension must be adjusted so there is a 1-2 mm gap between the coils. This applies the ideal amount of resistance when breaking away. The spring tension can be adjusted by tightening or loosening the adjustable eyebolt.

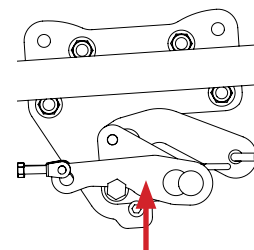
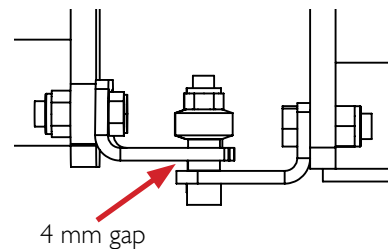
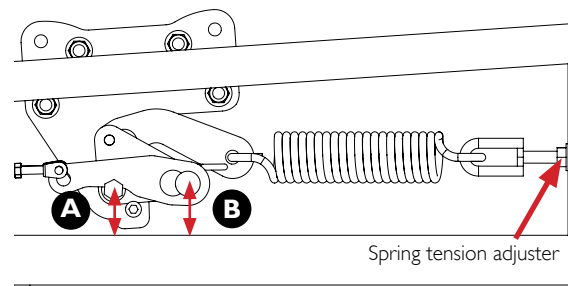
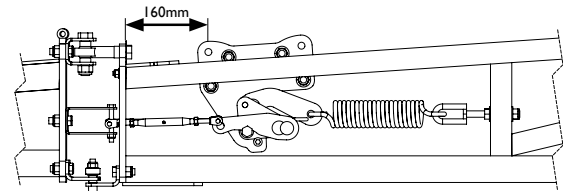
To check the tension a spring scale can be used by hooking it on the boom tip. It should require about a 5 kg force to breakaway.

Maintenance

Two factors are critical in ensuring the breakaway functions correctly. The vertical measurement (17-18 mm) shown in step 5, and the tension of the spring.

Should the spring eyebolt reach maximum adjustment without applying sufficient tension on the spring, the spring may need to be replaced or the hinge mounting plate may need to be moved closer to the end of the boom. If either of these adjustments are made, the turnbuckle must be readjusted.

To ensure smooth and long lasting operation of your breakaway mechanisms, and to avoid premature failure of components, they must be oiled every 8 hours.



Chapter 10

LUBRICATION & MAINTENANCE

Maintenance Schedule

FREQUENCY	MAINTENANCE TASKS
8 hour	Check pump oil level & condition
8 hour	Check tyre pressure
8 hour	Check wheel nuts are torqued correctly to 320 ft/lb
8 hour	Grease tilt arm pivot pins
8 hour	Grease cable drum bearing block pivots
8 hour	Clean pressure and suction filters if blocked
8 hour	Clean airbag and foam marker compressor air filter
8 hour	Clean direct chemical injection air filter (where fitted)
8 hour	Grease pump PTO shaft universal joint nipples
25 hour	Grease cable adjuster pivots
25 hour	Grease wheel bearings
50 hour	Grease pump PTO shaft inside safety cover
50 hour	Grease boom mount rose ends
50 hour	Grease all delta links on centre section
50 hour	Grease paralift arm rose ends
50 hour	Towing eye
50 hour	Grease boom lifting cylinders
50 hour	Check Aluminium outer boom bolts
150 hour	Check wheel bearings for sideways movement
300 - 350 hours	Change pump oil
3 months	Check bolts on axle bearing caps
3 months	Check the condition of the brakes extensively
3 months	Grease jack
3 months	Grease braked axle cam shaft bearing lightly
Yearly	Clean wheel bearings, inspect, re-grease and set rolling torque
Yearly	Carry out a complete decontamination of the sprayer
Yearly	Check pump air accumulator pressure is at an equal pressure to the spraying pressure

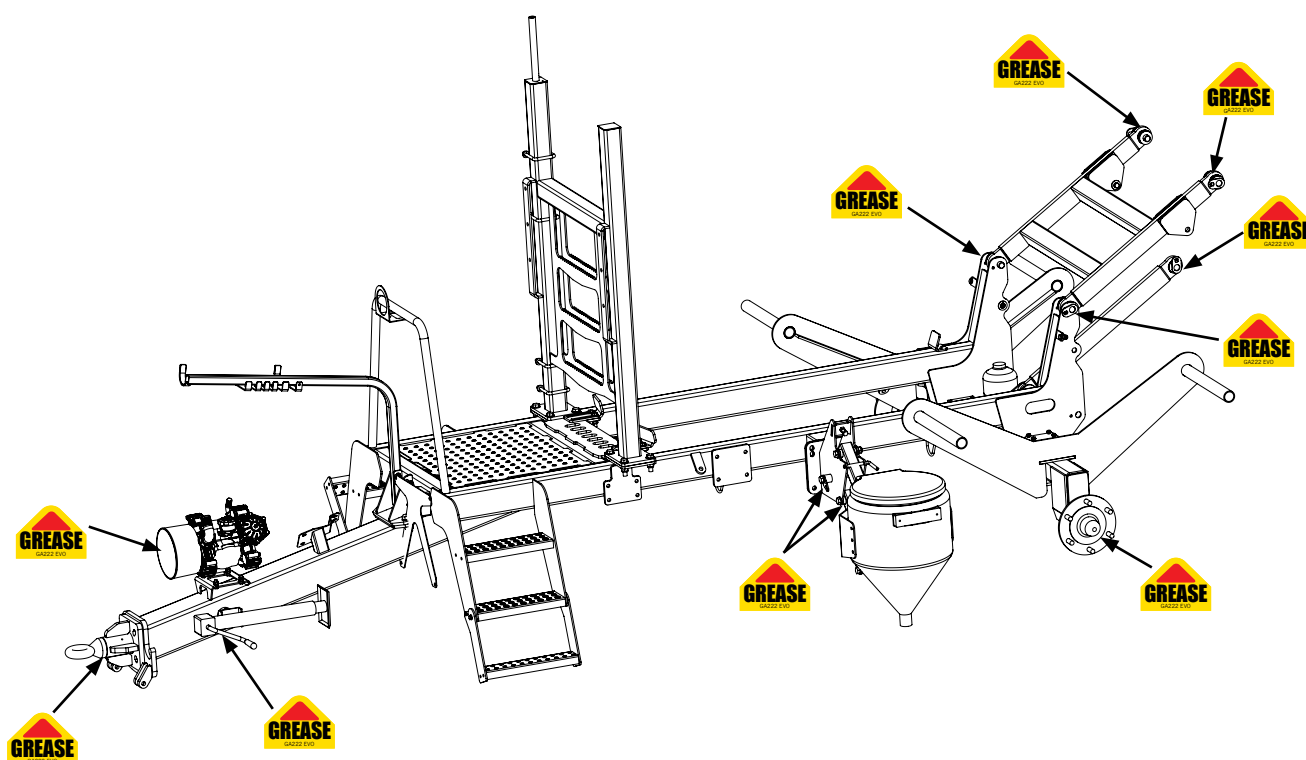
Lubrication

Goldacres recommend that a quality multi purpose grease should be used when lubricating your equipment.

A SAE 30W40 engine oil should be used in the diaphragm pump.

The pictures below outline key lubrication points. All hydraulic cylinders (excluding wing tilt cylinder) have grease points on the clevis ends.

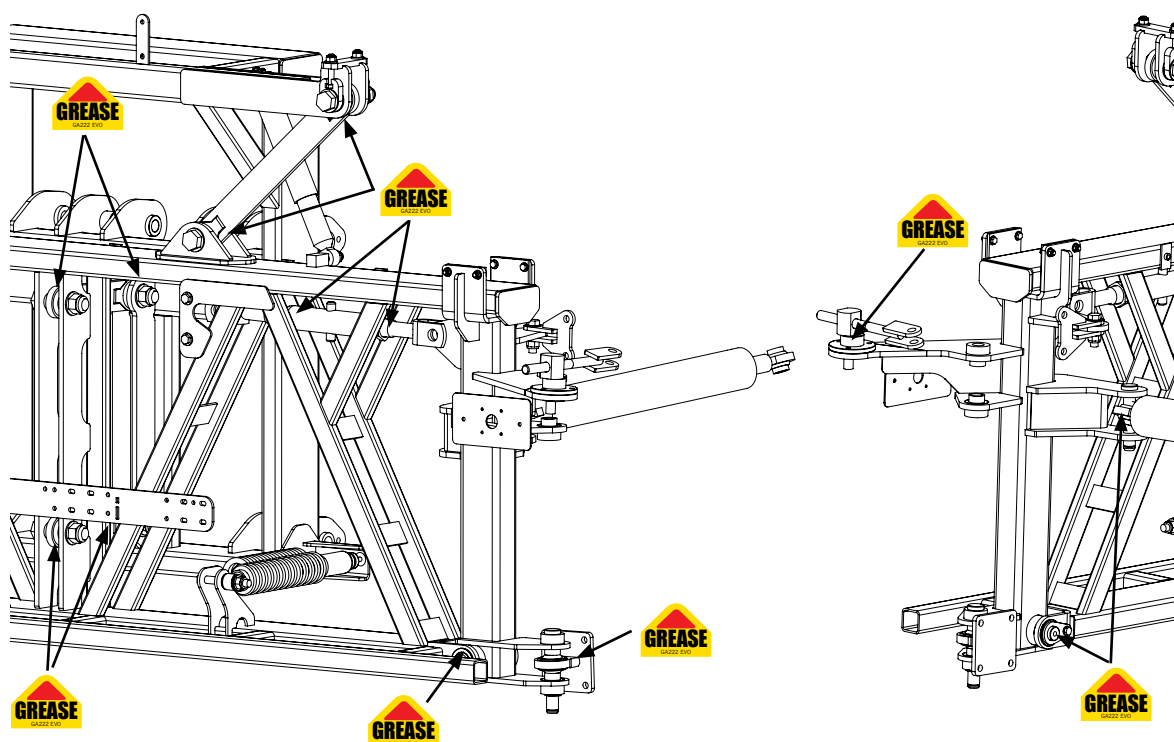
Lubrication Points - Chassis & PTO Shaft



LOCATION	GREASE INTERVAL
PTO Shaft universal joints	8 hourly
Wheel bearings	25 hourly
Hitch	50 hourly
PTO telescopic shaft	50 hourly
Paralift arm rose ends	50 hourly
Boom lift cylinders	50 hourly
Jack	3 monthly
Induction hopper pivots	3 monthly

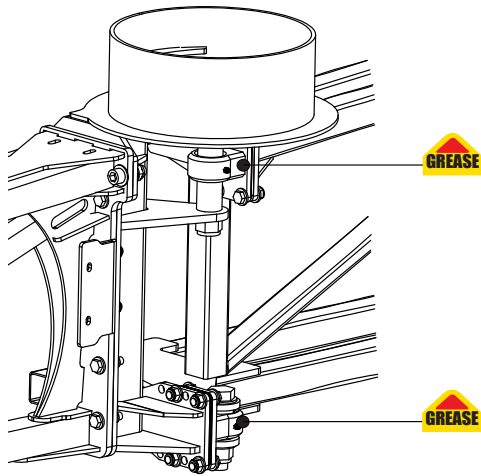
NOTE: The drawing above does not show hydraulic cylinders. Each hydraulic cylinder has a grease nipple located at each end. These points should be greased on a 50 hourly basis.

Lubrication Points - Centre Section - Delta



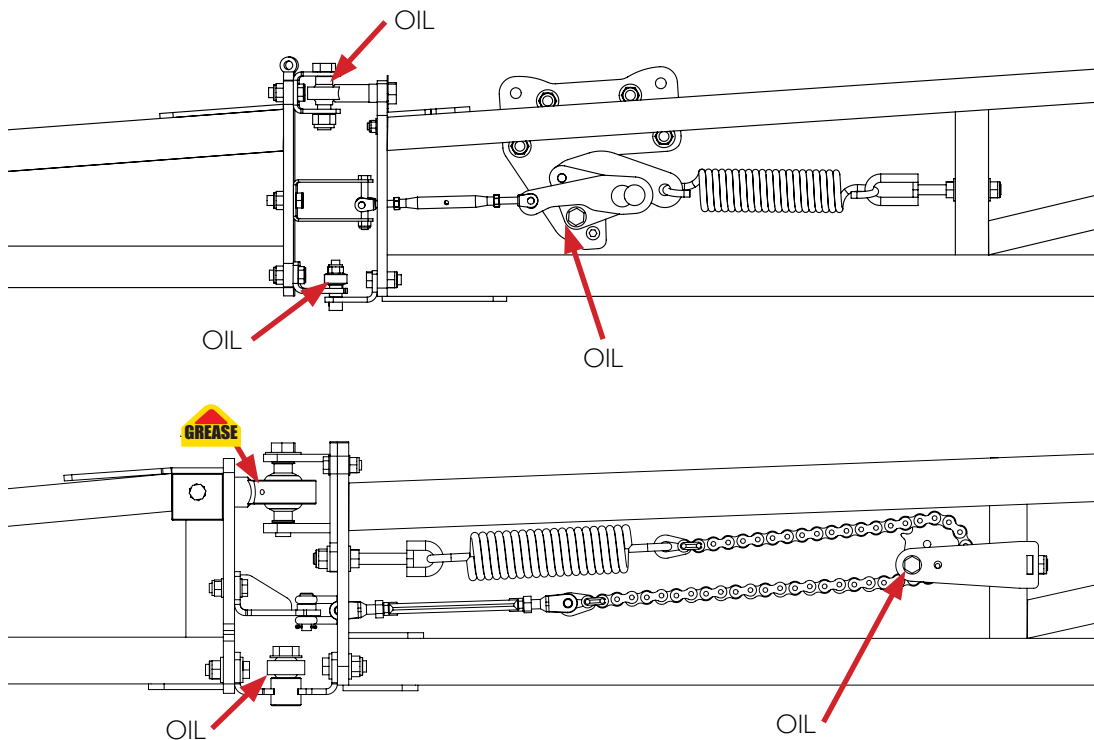
LOCATION	GREASE INTERVAL
Hydraulic cylinder rose ends	8 hourly
Tilt arm pivot pins	8 hourly
Cable adjuster pivots	25 hourly
Boom mount rose ends	50 hourly
Delta links	50 hourly

Lubrication Points - Cable Drum



LOCATION	GREASE INTERVAL
Cable adjuster pivots	8 hourly
Cable drum bearing block pivots	8 hourly
Tilt arm pivot pins	8 hourly
Cable adjuster pivots	25 hourly
Boom mount rose ends	50 hourly
Delta links	50 hourly

Lubrication Points - 3D Breakaways



LOCATION	GREASE/OIL INTERVAL
Pivot points on 3D breakaways	8 hourly
Tip rose ends	8 hourly

Maintenance - General

Pressure Relief Valve

The pressure relief valve provides relief when the pressure exceeds a pre-determined value. Altering the adjusting stem will affect the setting at which the relief valve will come into operation. Turning the stem clockwise will increase the pressure relief setting. Goldacres pre-sets the pressure to approximately 110 PSI and this should not be altered. To check or alter this setting, turn the pump OFF and turn relief valve counter clockwise. Turn the solenoids OFF, and then close all control manifold ball valves so that all flow passes through the relief valve. Run the pump at maximum operating speed (540 RPM) and slowly turn the relief valve clockwise until the pressure is achieved. Tighten the nut on the adjusting stem so that this setting is maintained. If the relief setting is too low, excessive flow will be allowed to bypass back to the tank and it will limit the maximum obtainable pressure.

Pump

8 HOURS

Check pump oil level and condition.

50 HOURS

Pump oil should be changed after the first of 50 hours of operation.

Pump oil level should be between the two level markers on the oil reservoir. If the oil level continually gets low or is turning milky, there is possibly a split in a diaphragm. The oil will need to be drained and all the diaphragms replaced. Use SAE 15W40 oil. Rotate the pump manually (by hand) to remove any air locks while filling. Do not over fill.

Grease pump PTO shaft; shaft universal nipples and telescope nipple must be greased every 8 hours. The cover must be greased every 40 hours to ensure it spins freely on the shaft.

250 HOURS

Change Pump oil; pump oil should be changed every 250 hours. Use SAE 15W40 oil. The oil drain plug is located between the two pump mounts on the underside.

SEASONALLY

Check pump air accumulator (where fitted). The air pressure in the air accumulator must be maintained to the correct pressure (approximately half of

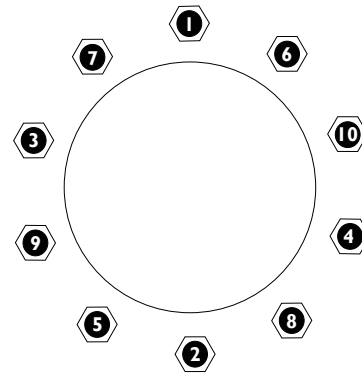
the spray pressure). If the accumulator constantly loses pressure, the valve or diaphragm may need replacing. To recharge the accumulator, charge it to approximately half of the spray pressure then run the pump at normal operating RPM. Looking at the pressure gauge, release some pressure until there is as little pulsation as possible. This will ensure a very even and constant pressure delivery.

Chassis, Wheels, Tyres & Axles

8 HOURS

Check tyre pressure; it is very important to maintain correct tyre pressures to optimize sprayer stability and the load rating. To determine the required tyre pressure, refer to the tyre specification chart in the general information section of the operator manual. If the tyre has a constant leak, the valve may be loose or need replacing, or the tyre may have a puncture.

Wheel nuts must be checked every 8 hours and re-torqued to 320 ft/lb if required. Follow the sequence below to ensure an even torque distribution.



Above: Follow this tightening sequence to ensure even wheel nut torque distribution (320 ft/lb).

25 HOURS

Grease the wheel bearings; grease is applied to the ADR axle via a grease nipple on the front of the hub.

150 HOURS

Check wheel bearings for sideways movement; to check the wheel bearings for free play, jack up that side of the sprayer until the wheel can spin freely. Rock the wheel from side to side. If there is any movement the bearings will need to be tightened or replaced.

Continued over page

Maintenance - General

3 MONTHS

Grease the jack; there are two grease nipples on the sprayer's jack. One on the winding mechanism and one on the jack swing pivot. Both need to be greased every three months to ensure easy operation.

Check bolts on axle bearing caps; bearing caps must be regularly checked and tightened if required. If dust is able to enter the axle bearings it could cause the bearings to fail. If the gasket on the dust cap is damaged or not sealing properly it must be replaced.

Changing Wheels

REMOVING A WHEEL

- The sprayer must be hitched to the appropriate towing vehicle.
- The engine of the towing vehicle must be turned off and the park brake applied.
- Chock the wheel(s) that is/are not to be removed with an appropriate item to prevent the sprayer from moving.
- With a wheel nut wrench, loosen all the wheel nuts on the wheel that you wish to remove (Do not remove wheel nuts until the tyre is off the ground).
- Place a jack on level, firm and stable foundation under the sprayer axle and between the two axle bolts near the wheel to be removed. The jack may need to have a large piece of timber or steel placed under it so that the jack will not sink.
- Use the jack to raise the sprayer axle such that the wheel is off the ground.
- Place an auxiliary jack block under the sprayer so that if the jack fails the sprayer will not fall.
- Remove all wheel nuts and remove wheel from sprayer. Be careful that the wheel does not fall on any person and cause bodily harm.
- Ensure that the sprayer is stable when being left for an extended period of time.

REFITTING A WHEEL

- Make sure the sprayer is stable when supported with the jack and the jack block in place and hitched to the appropriate towing vehicle.

- Make sure the wheel is in a satisfactory condition to use and that the tyre is inflated to the correct tyre pressure.
- Clean the surface between the wheel and the hub.
- Carefully lift repaired/new wheel up so that the holes in the rim centre go over the wheel studs on the wheel hub.
- Carefully put the wheel nuts on and tighten them finger tight.
- With a wheel nut wrench tighten wheel nuts alternately and evenly to a torque rating of 320 ft/lb.
- Remove the jack block from under the sprayer.
- Carefully lower the sprayer slowly with the jack until the tyre touches the ground.
- Retighten the wheel nuts to the required torque rating.
- Let the jack completely down so that all weight is taken off the jack and remove jack (and any supports placed under the jack) from under the sprayer.
- Remove wheel chocks that were placed to the front and rear of the opposite wheel (to prevent it from moving).
- Check tyre pressure before moving sprayer.
- Retighten wheel nuts to the required torque rating: One hour after fitting the tyre, before filling main spray tank, after the first tank load.

Booms

8 HOURS

- Grease tilt arm pivot pins.
- Grease cable drum bearing block pivots.

25 HOURS

- Grease cable adjuster pivots.

50 HOURS

- Grease boom mount rose ends.
- Grease all delta links on centre section.
- Grease paralift arm rose ends.

Maintenance - General

ADJUSTING PARALIFT BOOM RIDE HEIGHT SWITCH

The ride height switch is used to adjust the minimum boom height. The switch is located on the bottom of the left hand side of the boom paralift.

1. Loosen the two adjustment knobs on ride height bracket
2. Lowering the switch lowers the minimum boom height. Raising the switch raises the minimum boom height.
3. Each notch gives approximately 100 mm of boom height adjustment.
4. Tighten knobs once adjusted. The hydraulic cylinders must have 50 mm of travel remaining.

REPHASING HYDRAULIC BOOM CYLINDERS

If the sides of the boom do not fold together so that they become out of line, the hydraulic rams will need to be re-phased.

Open the boom right out and continue to hold the control lever in that position for several seconds until the rams are synchronised.

Air should be removed from the system periodically or after servicing hydraulic components. Extend the booms fully with the system running and loosen a line fitting on the ram slightly to allow air to escape. Then re-tighten and cycle boom folding through full extents to re-phase.



Filters

CAUTION: Read and heed the chemical label warnings regarding PPE before cleaning any filter.

If in-line filters have been fitted to replace nozzle filters, always unfold and lower the boom before attempting to unscrew any filter.

It is essential to maintain all filters and filter screens in good condition. Filter screens that are not regularly cleaned can severely impede liquid flow and delivery pressure. If the screens are in anyway damaged, they can allow foreign material into the

pumping system which can result in damage to the pump, solenoids, valves and cause blockages in nozzle tips. Also, if the screens are not properly fitted, air can enter the pumping lines which will reduce pump performance.

Filter screens are best cleaned with a soft brush in clean water or by compressed air after washing.

SUCTION FILTER CLEANING

CAUTION: Wear gloves and other recommended protective clothing.

1. Ensure that the pump is turned OFF and the pump three-way ball valve is turned OFF to prevent flow to the filter.
2. Carefully unscrew filter nut and remove bowl.
3. Remove screen and clean.
4. Check for damage to screen, bowl, body and O-ring.
5. Place screen back in position.
6. Make sure O-ring is in position for proper seal.
7. Replace bowl and screw nut on. Do not over-tighten nut.

PRESSURE FILTER CLEANING

CAUTION: Wear gloves and other recommended protective clothing.

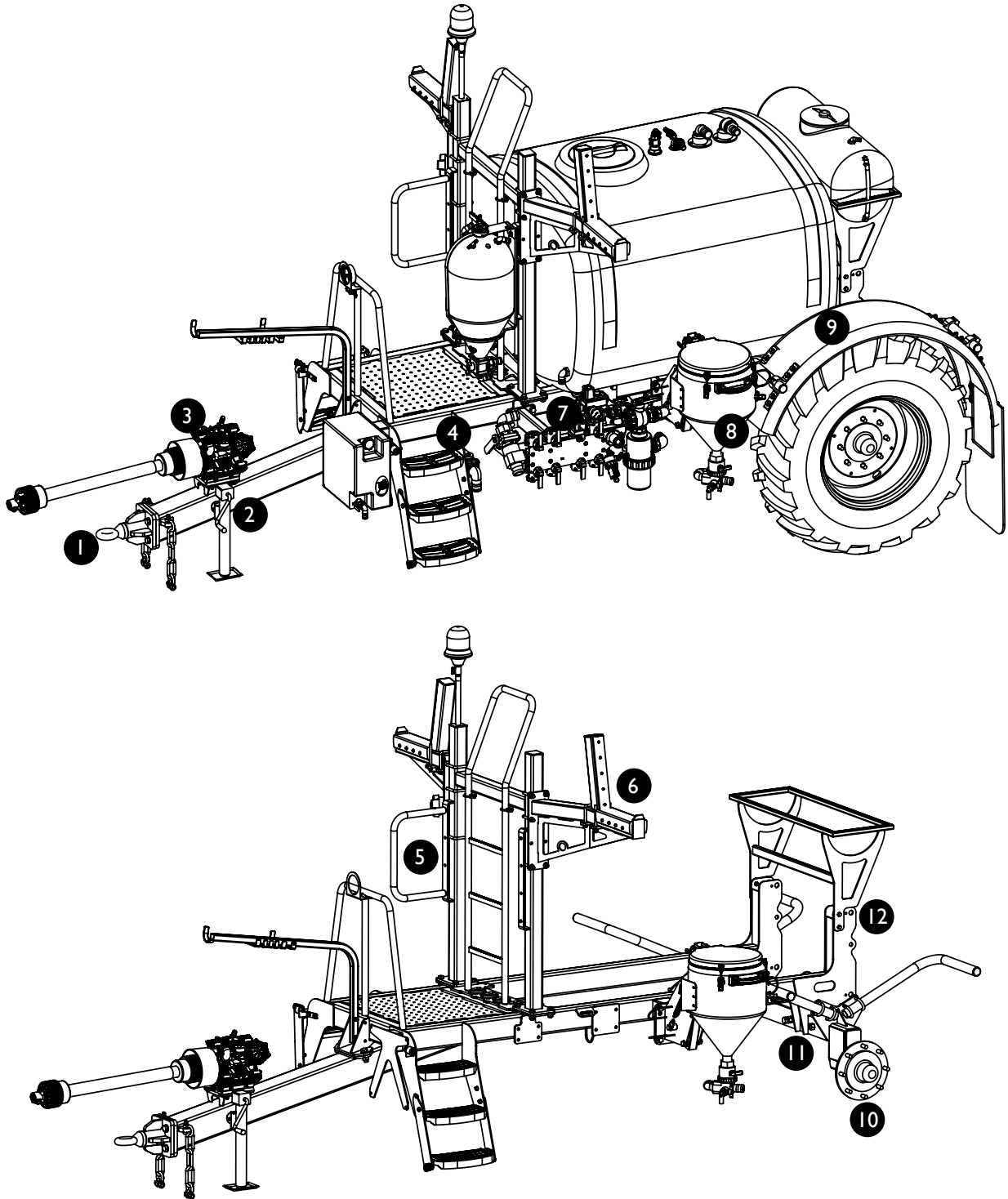
1. Ensure that the pump suction is turned OFF and the pump 3-way ball valve is turned OFF to prevent flow to the filter and pump.
2. Ensure that the supermix agitator ball valve is OPEN (will release any residual pressure. Also remove small cap on bottom of pressure filter to relieve pressure)
3. Carefully unscrew filter nut and remove.
4. Remove screen and clean.
5. Check for damage to screen, bowl, body and O-ring.
6. Place screen back in position.
7. Make sure O-ring is in position for proper seal.
8. Replace bowl and screw nut on. Do not over-tighten nut.

Corrosion Prevention

Goldacres are applying G15 anti corrosion spray to all fasteners (bolts, washers and nuts) and zinc plated components at the time of manufacture.

G15 should also be applied to the sprayer pre and post season.

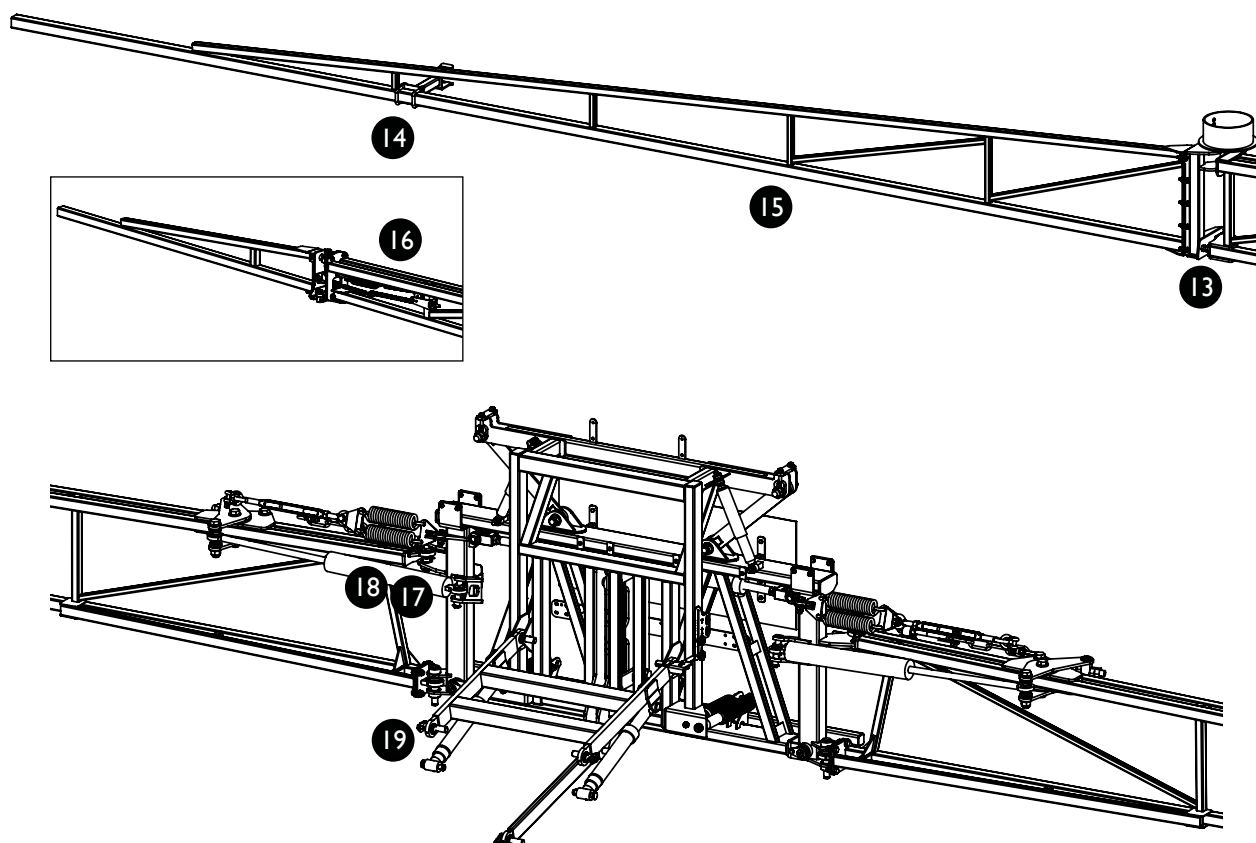
Use the following as a guide for areas to spray with corrosion inhibitor. This guide is not necessarily comprehensive and the amount of corrosion protection necessary will ultimately depend on local and operating conditions.



Continued over page

Corrosion Prevention

NO.	DESCRIPTION	NO.	DESCRIPTION
1.	Towing eye bolts	7.	LH pod frame mounting bolts
2.	Jack mounting bolts & locking pins	8.	Induction hopper bolts & latches
3.	Spray pump	9.	Mudguard mounting bolts
4.	Steps & hand rails	10.	Wheel nuts
5.	H-frame & handrails	11.	Axle bolts
6.	Boom rests	12.	Rinse tank frame mounting bolts



NO.	DESCRIPTION	NO.	DESCRIPTION
13.	Cable drum bolts	17.	Hydraulic cylinder fittings
14.	Boom protector u-bolts	18.	Hydraulic hose crimp fittings
15.	Nozzle bracket bolts	19.	Centre section parafit rear pins & bolts
16.	Breakaway hinges (where fitted)		

Chapter 11

TROUBLESHOOTING

General

The following troubleshooting information is provided as a reference when your sprayer is not functioning correctly. To ensure that you receive the best possible service, it is recommended that you exhaust all applicable troubleshooting solutions

shown in this chapter prior to calling your dealer, or Goldacres, for service advice

Parts information and schematics can be found in the parts manual supplied.

Tanks, Chassis & Wheels

PROBLEM	COMMON CAUSES	COMMON SOLUTION
The drawbar of the sprayer has become noisy and loose	Worn, or missing, plastic insert in towing eye	Replace plastic insert

Induction Hopper

PROBLEM	COMMON CAUSES	COMMON SOLUTION
Induction hopper is not performing as well as it should	Insufficient flow to venturi in the hopper bottom	Check the pressure supplied to the hopper bottom is around 550 kPa (80 PSI).
	Air leaks on induction system	Check all hoses, clamps, and cam lever fittings are sealed

Spray Pump

PROBLEM	COMMON CAUSES	COMMON SOLUTION
Pressure and flow rate are too low	Pump	Check suction line for air leaks.
		Suction filter may be blocked.
		Check pump speed. 400 - 540 RPM
		Check oil for colour change. If the oil appears milky, a diaphragm will be damaged and needs to be replaced.
		Check valves in pump.
		Turn the pressure station ball valve to off, if the pressure increases on the pump gauge there is a problem with the control valve.
		Measure the flow per minute coming out of one nozzle and check the nozzle chart for the corresponding flow.
		Check the regulator valve is rotating the full 90 degrees when the boom valves are switched off.
		Check tank sump and suction line blockages.
	Excessive bypass on pressure manifold	Verify console calibration settings.
	Supply to pump is restricted	Check the pressure relief valve setting on pressure manifold.

Continued over page

Spray Pump

PROBLEM	COMMON CAUSES	COMMON SOLUTION
Pressure and flow rate are too high	Bypass line is restricted or blocked..	Verify console calibration settings. Check for restriction in bypass line. Check pump speed is not too fast. Check if Bypass valve is turned on
The pressure on my gauge is higher than the nozzle flow indicates	Blocked filters of nozzles	Check and clean all pressure and nozzle filters
	Flow loss due to resistance in lines, valves and filters.	Re-calibrate console to allow for pressure loss
The flow rate is correct but my pressure is too low or high.	Nozzles	Check nozzle chart for correct nozzle size.
Pressure fluctuation	Air leak on suction side of pump	Check suction pump for air leaks.
	Incorrect pump speed	Adjust pump speed so it is between 400 - 540 rpm
	Faulty pump valves	Replace pump valves
Pump pressure pulsating	Air accumulator pressure is incorrect (if fitted)	Reset the pressure in air accumulator
	Air accumulator diaphragm has a leak (if fitted)	Replace air accumulator diaphragm
	Incorrect pump speed	Adjust pump speed so it is between 400 - 540 rpm
	Air leak on suction side of pump	Check pump suction for air leaks
Pump oil is becoming milky	Cracked diaphragm	Replace all diaphragms
Pump is noisy	Low oil level	Refill or replace oil
	Damaged pump valves	Replace pump valves
	Pump suction line has air leak or is restricted	Clean suction filter and check for leaks in suction lines
Pump housing or mounting cracked.	Extremely cold weather can cause liquid in the pump to freeze	Check for ice in the pump and let defrost if required
Damaged universal joint	The shaft is too long	Shorten shaft
	PTO shaft is inadequately lubricated	Lubricate PTO shaft and uni joints
PTO shaft bent or vibrating excessively	PTO shaft is too short	Replace PTO shaft

Plumbing

PROBLEM	COMMON CAUSES	COMMON SOLUTION
Boom valves fail to open	Insufficient power.	Check all wiring and connections to ensure there is 12 volts at the valves.
	System pressure greater than 150 PSI.	Reduce the system pressure
Boom valves fail to close	Insufficient power.	Check all wiring and connections to ensure there is 12 volts at the valves.
	Foreign objects blocking plunger from seating.	Clean the inside of the boom valves.
No water at boom	No Tier valve entered or is at 0	Enter value greater than 0

Hydraulic & Pneumatic

PROBLEM	COMMON CAUSES	COMMON SOLUTION
No hydraulic pressure.	Low hydraulic oil level	Check the oil level in the hydraulic reservoir and top up if necessary
	Fill pump is engaged	Switch the hydraulic fill pump off
The air bags are not inflating	Low system pressure	The bags will not inflate until the pressure in the system is above 75 PSI, check system pressure.
	Compressor not working properly	Check that the compressor is working correctly
Machine sits unevenly	Incorrectly adjusted ride height valves.	Adjust the ride height valves as per the instructions in the Lubrication and Maintenance chapter.

Flow Meter & Controller

PROBLEM	COMMON CAUSES	COMMON SOLUTION
Application rate is inaccurate, unstable or zero	Incorrect console calibration	Re-calibrate console
	Inconsistent ground speed reading	Check cabling
	Inconsistent flow meter reading	Replace flow meter
	Faulty control valve	Replace control valve Check using manual increase/decrease flow control
Speed sensor display is inaccurate, unstable or zero	Incorrect speed calibration	Re-calibrate console speed
	Faulty cable	Test cable as per instructions following
Volume display is inaccurate, unstable, zero or not changing	Meter calibration is incorrect	Reset meter calibration
	Flow meter cable pins are corroded	Replace flow meter plugs & pins
	Flow meter is pointing the wrong way	Disconnect flow meter and reinstall in the correct orientation
	Faulty cable	Manually test the cable
Flow meter appears not to be working	Flow meter is seized or blocked	Remove and clean any foreign materials so the turbine spins freely
	Faulty cable	Test cable as per instructions following
	Calibration figure is incorrect	Reset meter calibration
Application rate or pressure will not alter	Faulty control valve	Test valve manually and replace if required
Control valve has failed	Faulty cable Faulty valve	Replace control valve
		Temporary solutions: Remove the motor from the 3 way ball valve and manually adjust the flow by turning the shaft with a spanner
Raven Console not working	No power supply	Check loom connection at the back of the console
		Check connection to battery terminals
		Check the fuse in the back of the console
		With a multi meter, check the voltage potential across pins 1(-) and 16(+) on the 16 pin plug going into the console (Should be at least 12v)

If the flow meter fails to give accurate readings, the following actions should be taken:

- Adjust the spraying pressure by putting the flow control switch into manual and using the increase decrease switch to adjust to the desired pressure as shown on the pressure gauge on the sprayer.
- Drive the sprayer at a constant speed in order to apply the required application volume as determined by the nozzle selection chart.
- The sprayer should then be operated to empty the tank. Once the sprayer is empty of chemical, partially fill the tank with fresh water so that test can be performed in order to correct the problem. Repair or replace the flow meter as soon as possible.

Continued over page

Flow Meter & Controller

Use the following procedures to the manually override the boom valves and control valve if the Raven console has failed or is otherwise not able to operate them:

FLOW CONTROL VALVE OVERRIDE

1. Remove electric motor from three way fast close valve, and manually rotate valve until desired spraying pressure is achieved.
2. Drive the sprayer at a constant speed in order to apply the required application volume as determined by the nozzle selection chart.

The sprayer should then be able to be operated in order to empty the tank. Once the sprayer is empty of chemical, partially fill the tank with fresh water (no chemical) so that testing can be performed in order to correct the problem. Repair or replace the console as soon as possible.

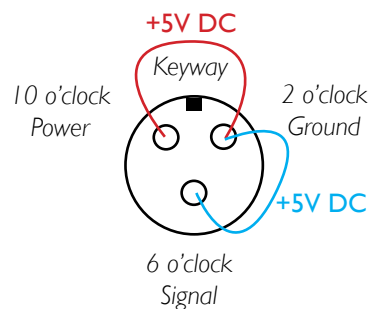
BOOM VALVE OVERRIDE

1. Disconnect console from console cable.
2. Remove Cap from boom valves.
3. Remove Shaft locking Screw.
4. Wind plunger shaft anti-clockwise to open valve.
5. To start and stop spraying through the nozzles, start and stop the pump.

NOTE: There is no agitation while the nozzles are not spraying.

Testing Raven Flow Meter Cable

1. Change meter Cal number to 1 with the [Meter Cal] key.
2. Press [total volume] key and place boom switches ON.
3. With a jumper wire e.g. paper clip, short between 6 o'clock and 2 o'clock sockets with a "short" then "no short" motion. Each time contact is made the [total volume] should move up in increments of 1 or more.
4. If total volume does not count up, perform test at the next connector closer to the console. If this next test works, the previous section of cable must be faulty and should be replaced.
5. Perform the voltage checks shown below.
6. Change [Meter Cal] number back to previous number.



Voltage Readings

2 o'clock - 6 o'clock (+5V DC)

10 o'clock - 2 o'clock (+5V DC)

Chemical Probe

PROBLEM	COMMON CAUSES	COMMON SOLUTION
Chem probe is not working or is working too slow	Air leak in the vacuum system	Check all hose clamps and fittings are tight
	Lack of pressure to venturi in top of tank	Check there are no kinked hoses and the water pressure is about 100 PSI

ISOLATING POSSIBLE AIR LEAKS

Step 1: Check the operation of the chemical probe. If this will transfer water at a minimum of 30 L/min then this part of the system is okay.

If not check for air leaks at:

- Cam lever fitting at the probe
- Hose fittings
- Venturi – the venturi can suck air (less vacuum) where the black drop-pipe connects to the orange venturi
- The venturi may also suck air where the 'lay flat' hose joins the bottom of the black PVC drop pipe

Step 2: If probe works correctly but envirodrum will not operate, check for air leaks in envirodrum fitting (this must be thoroughly cleaned after each use) and check interior pipes in the envirodrum for air leaks or damage.

SUMMARY

Check the flow of water into venturi.

Then:

1. Check the probe only.
2. Check probe and envirodrum section.

NOTE: Tests must be done with water because the speed of the transfer is affected by chemical viscosities.

Spray Nozzles

PROBLEM	COMMON CAUSES	COMMON SOLUTION
Streaky pattern coming from nozzle	Nozzle tip blockages.	Check for blockages by removing the nozzle, rinsing thoroughly with water and cleaning with compressed air. DO NOT clean by blowing into nozzle with mouth.
	Nozzle worn or damaged.	Visually inspect nozzle for damage or wear; conduct a jug test if necessary.
No spray coming from nozzle	Nozzle tip blockages.	Check for blockages by removing the nozzle, rinsing thoroughly with water and cleaning with compressed air.
	Check valve blockages.	Remove the check valve and clean as required.

Transcal

PROBLEM	COMMON CAUSES	COMMON SOLUTION
Transcal is not working or is working too slow?	Air leak in the vacuum system	Check all hose clamps and fittings are tight
	The volume of water supplied to the Venturi	Check there are no kinked hoses and the water pressure is about 100psi
The Transcal tank has deformed and sucked in?	Residual vacuum left in tank when it is not in use. This is especially important when spraying in warm weather or when the sprayer is parked overnight.	When use of the Transcal is complete, make sure the venturi probe tap is turned off and let the tank vent.
The sight tube on the Transcal is not giving a true indication of the tank level?	Probe or envirodrum couplers turned on	Ensure the tap on the Probe or Envirodrum coupler is turned off before evaluating the tank level.

ISOLATING POSSIBLE AIR LEAKS

Step 1: First check the operation of the chemical probe only i.e. bypass the Transcal tank. If it is found to transfer water at a minimum rate of 30L/min, then this part of the system is okay.

If not, check for air leaks at:

- Cam lever fitting at the probe.
- Hose fittings.
- Venturi – the venturi can suck air (less vacuum) where the black drop-pipe connects to the orange venturi.
- The venturi may also suck air where the 'lay flat' hose joins the bottom of the black PVC drop pipe.

Step 2: Check Transcal tank. If the probe is working successfully but the Transcal tank system won't work then the air leak areas to check are:

- The Tank lid. This lid may tighten against the metal bracket above the tank and not the tank itself. Also the top of the tank needs to be clean and smooth for the lid to seal. Also check the lid for cracks and condition of the seal.
- Fitting at the base of the Transcal tank.
- Any hoses and connectors.

Step 3: If probe works correctly and Transcal tank works correctly when using suction probe but envirodrum will not operate, check for air leaks in envirodrum fitting (this must be thoroughly cleaned after each use) and check interior pipes in the envirodrum for air leaks or damage.

SUMMARY

Check the flow of water into venturi and then:

1. Check the probe only.
2. Check the probe and Transcal.
3. Check Transcal and envirodrum section.

NOTE:

- Tests must be done with water because the speed of the transfer is affected by chemical viscosities.
- Do not remove drop pipe from venturi except for resealing.

Delta Boom

PROBLEM	COMMON CAUSES	COMMON SOLUTION
Inner and outer wing are not in line with each other when the boom is unfolded	Boom cables are not adjusted correctly	Adjust boom cables to realign booms
	Stopper bolt holding out the boom	Adjust the boom stopper bolt
Booms will not fully fold to the boom rests	Insufficient lubrication	Lubricate all boom pivots
	Fold cylinder mounts have moved	Adjust fold cylinder mounts
Boom unfold unevenly	Air trapped in the phasing cylinders	Unfold booms completely and hold switch for a few seconds. Then, fold booms completely and hold switch for a few seconds. Do this multiple times as necessary to purge any air out of the hydraulic lines.
Outer boom does not line up with the inner wing when unfolded	Incorrect boom adjustment	Fold the boom out and note the position the outer boom is in. Fold the boom in to transport position and note position outer boom is in. Follow the table below to adjust boom so it sits level in the out (work) position and to have the bottom chords sitting parallel in the folded (transport) position
Booms are showing signs of bending components and welds cracking	Folding or unfolding of booms is too fast	Reduce the hydraulic flow to the folding cylinders
	Folding or unfolding of booms while the sprayer is still moving	Do not fold or unfold the boom while the sprayer is still moving
	Tilt operation	Tilt operation should be kept to a minimum. If the tilt operation is too fast, reduce the oil flow

SHIM ADJUSTMENT

The shim adjustment at the cable drum will affect the position of the outer boom when unfolded and when in the folded position. Use the table below to add or remove shims. The table below shows the position of the boom and the adjustment necessary to get them level.

OUTER WING POSITION (UNFOLDED)	OUTER WING POSITION (FOLDED)	TOP PIVOT SHIM ADJUSTMENT	BOTTOM PIVOT SHIM ADJUSTMENT
Up	Up	NIL	Remove Shims
Up	Down	Add Shims	NIL
Level	Up	Remove Shims	Remove Shims
Down	Down	NIL	Add Shims
Down	Up	Remove Shims	NIL
Level	Down	Add Shims	Add

OPTIONAL ACCESSORIES

General Information

The following pages provide information on Goldacres optional accessories available on this equipment.

NOTE: These options may not be fitted to your sprayer unless ordered.

Chemical Induction Probe

Overview

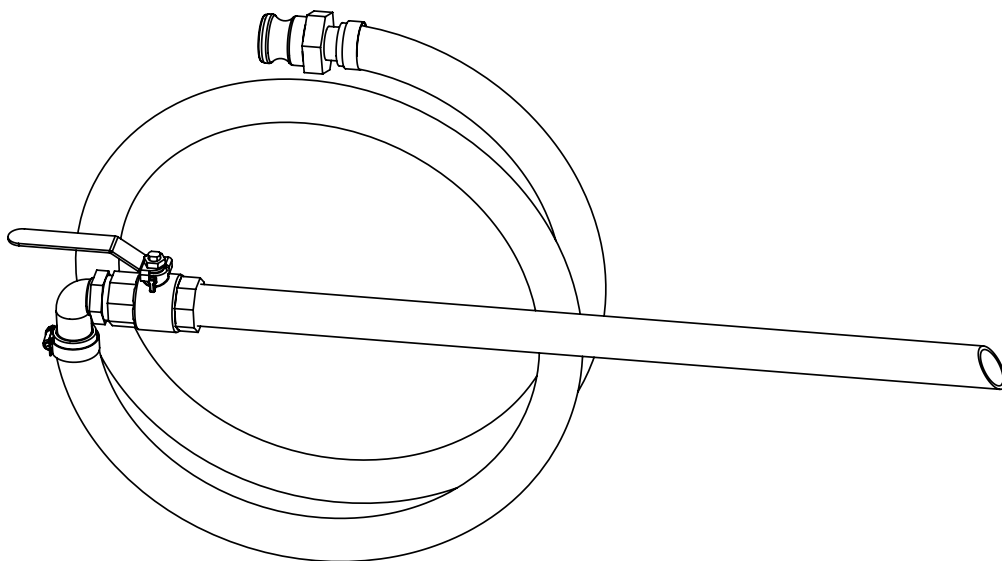
A simple method of transferring chemical into the sprayer tank is via the chemical probe. The chemical probe enables the chemicals to be transferred with minimal exposure to the operator. The probe is used in conjunction with the Venturi filler (located on the top of the tank) which creates the required suction on the pressure side of the pump.

The viscosity of the chemical being transferred will affect the rate of suction flow and hence the amount of time required to transfer the chemical. Water and air have low viscosities whereas molasses is an example of a highly viscous liquid. The higher the viscosity of the liquid, the longer it takes to transfer

via the chemical probe. If the viscosity of a chemical is such that it takes too long to transfer, dilute the chemical with water, which will reduce the viscosity, and then transfer the solution.

The chemical should be transferred after about 20-50 % of the required water quantity has been added to the sprayer tank. This will ensure that agitation takes place when the remaining water is added.

The end of the probe is not flat so that the probe, when placed flat against the bottom of the container, will not restrict the flow of chemical.



Continued over page

Chemical Induction Probe

Operation

WARNING: It is critical that the chemical probe venturi continues to operate for a minimum of 30 seconds following use. This will ensure that no chemical is left in the line prior to the probe being disconnected.

NOTE: This item is intended for the induction of liquid chemicals only.

Once chemical has been transferred into the main spray tank the sprayer should always be agitating until spraying begins.

CHEMICAL PROBE OPERATION

1. Add 20 percent of the tank's volume of clean water to the main spray tank. Initially there needs to be a sufficient amount of water in the tank in order for the pump delivery to create the venturi effect via the venturi filler.
2. Ensure that the red handle on the pump 3-way valve is pointing towards the suction hose coming from the main tank sump.
3. Connect probe via cam lever fitting. Close all ball valves and set pressure to 110 PSI.
4. OPEN the venturi and agitator valves.
5. Close the bypass and induction hopper valves.
6. Operate the pump at the speed necessary to generate at least 85 PSI delivery pressure (as displayed on the pressure gauge mounted on the side pod). Do not run faster than 500 RPM. The higher the pump delivery pressure, the greater the venturi suction and the quicker the probe will transfer the chemical. The delivery pressure should not exceed 100 PSI as determined by the pressure relief valve setting.
7. Place probe in chemical.
8. OPEN the valve on the probe.
9. The chemical should be now transferring to the sprayer tank via the venturi filler.
10. When all of the chemical has been transferred, rinse the chemical container with water and transfer the rinsate to the sprayer tank via the probe. This should ensure that the entire chemical is transferred and that the probe, venturi filler and connecting suction hose are cleaned. Induct clean water to rinse probe vacuum hose.
11. When finished, CLOSE the valve on the probe and venturi valve. OPEN the bypass valve. Keep the agitator valve OPEN and disconnect probe.

Chemical Induction Hopper

Overview

The Chemical Induction Hopper is an alternative method of transferring chemical into the main spray tank. The hopper can be lowered to a more convenient height for adding chemicals. The chemical can either be in liquid form or granular form and once in the hopper the chemical can then be easily transferred into the main spray tank. The hopper facilitates drum rinsing with fresh water and the hopper itself can be rinsed and all rinsate then transferred into the tank.

The hopper transfers the chemical via venturi effect. Water from the main spray tank is pumped under the bottom of the hopper where it passes through a venturi fitting under the hopper. This causes a suction effect and when the bottom of the hopper is open (via the hopper tank valve) the tank contents are drawn into the flow from the pump passing under the hopper and then transferred into the middle of the main spray tank. This eliminates chemical attack resulting from high concentrations of chemical coming into contact with spray components.

NOTE: The level indicator should be used as a guide only.

NOTE: Never let the hopper run empty or suck air, this may cause foaming in the main tank.

Key Features

NUMBER	FUNCTION
1.	Rinse Tap
2.	Tank Rinse Nozzle
3.	Level Indicator 60 L
4.	Drain Tap
5.	Hopper Tank Ball Valve
6.	Drum Rinse Nozzle
7.	Pressure Water Mixing Jet Valve
8.	Hopper breather



Continued over page

Chemical Induction Hopper

Operation

1. Add at least 500 litres of clean water to the main spray tank. Initially there needs to be a sufficient amount of water in the tank in order for the pump delivery to create the venturi effect via the venturi fitting. This will also ensure that agitation takes place when the remaining water is added.
2. Lower the hopper for convenience. (Check that the delivery hose to the hopper is not restricted or kinked).
3. Ensure that the red handle on the spray pump three-way ball valve is pointing towards 'Suction from main tank'.
4. Open the induction hopper ball valve and (if required) the supermix agitator ball valve. Ensure the bypass line ball valve and the chemical probe ball valves are closed.
5. Operate the pump at the speed necessary to generate at least 80 PSI delivery pressure (as displayed on the sprayer pressure gauge). Do not run it faster than 540 RPM.

NOTE: The higher the pump delivery pressure, the greater the venturi suction and the quicker the hopper will transfer the chemical. The delivery pressure should not exceed 120 PSI as determined by the pressure relief valve setting.

7. Put the required amount of chemical into the hopper (liquid or granular). Wear the necessary protective clothing and use the required safety equipment to avoid exposure to chemicals.
8. Open the hopper tank ball valve at the bottom of the hopper by turning the yellow handle up. The chemical should be now transferring to the main spray tank.
9. Rinse all chemical drums and the hopper as per the rinsing instructions.

When finished using the hopper:

- Close the hopper tank ball valve at the bottom of the hopper by turning the yellow handle so that it is horizontal.
- Turn the bypass valve 'ON'.
- Turn the induction hopper valve 'OFF'.
- Ensure that the agitator valve is 'ON'. The sprayer should always be agitating until spraying begins.

- Raise the hopper to its transport position and replace the retaining pin and 'R'-clip in the mechanism.

Rinsing

RINSING FROM EXTERNAL SOURCE

To rinse the Induction Hopper and chemical drums with fresh water from the external water delivery station:

NOTE: Spray pump must also be operating.

1. Lower the hopper. (Check that the delivery hose to the hopper is not restricted or kinked).
2. Make sure that all valves on the EZ control external water delivery station are OFF.
3. Make sure that the Hopper Rinse valve on the top of the hopper is OFF.
4. Connect the fresh water fill hose to the quick-fill coupling.
5. Operate the fresh water pumping system between 70 and 100 PSI.
6. Turn the Induction Hopper valve on the Pressure delivery station ON.
7. Open the hopper tank valve at the bottom of the hopper by turning the yellow handle DOWN.
8. Ensure that the hopper drain tap, also located at the bottom of the hopper, remains CLOSED.
9. To rinse a drum, push the drum over the rinsing nozzle located in the top of the hopper.
10. To rinse the hopper, turn the Hopper Rinse valve on the top of the hopper ON. Close this valve when the hopper has been rinsed.

When the hopper is empty:

- Remove any chemical drums that have been rinsed from the hopper.
- Turn the hopper tank valve at the bottom of the hopper OFF by turning the yellow handle so that it is horizontal.
- Turn the Induction hopper valve on the EZ control Pressure Delivery station 'OFF'.
- Drain the hopper of any remaining liquid using the hopper drain tap at the bottom of the hopper.

Continued over page

Chemical Induction Hopper

RINSING OUT THROUGH DRAIN

The hopper can be rinsed and the rinsate emptied through the hopper drain ball valve rather than transferred into the main spray tank.

CAUTION: Spray pump should be turned off.

To do this:

1. Ensure the fresh water filling supply pump system is operating.
2. OPEN the hopper rinse valve on the side of the hopper.
3. OPEN the hopper tank ball valve at the bottom of the hopper by turning up the yellow handle so that it is vertical.
4. OPEN the hopper drain valve.
5. Once the tank is clean, stop the fresh water supply to the sprayer.
6. CLOSE the hopper rinse valve on the side of the hopper.
7. Turn the hopper tank valve at the bottom of the hopper OFF by turning the yellow handle horizontal.
8. Close the hopper drain valve.
9. Raise the hopper to its transport position and replace the retaining pin in the mechanism.

NOTE:

- Take proper safety precautions to avoid any contact with rinsate when draining, as it may contain chemical residue.
- Be mindful of where rinsate is deposited as it may contain chemical residue.
- This procedure will not rinse the hose from the bottom of the hopper to the main tank.



Hopper tank ball valve Hopper drain tap

Transcal

Overview

The Transcal volumetric measuring system is designed to provide a measuring facility without the need for an auxiliary pump and flowmeter. When used in conjunction with the venturi chemical probe, or micromatic fitting, the required volume of chemical can be transferred out of the chemical container into the Transcal tank.

The chemical can then be transferred into the main spray tank via venturi suction by simply turning a valve.

The system can be used with most types of chemical containers (including the envirodrum closed transfer system).

NOTE: The calibration markings on the Transcal tank should be used as a guide only.

NOTE: The Transcal system requires a vacuum to operate. Any air leaks in the tank lid, hoses or cam lever seals will affect the performance or cause total failure to operate.

WARNING: Do not fill Transcal tank past the 45 litre mark.

WARNING: Do not use the Transcal tank to store chemicals when spraying.

WARNING: Do not level tank under vacuum.



Continued over page

Transcal

Operation

1. Remove the cam lever plug and connect the chemical probe line or the Micromatic coupler to the cam lever fitting.
2. Ensure that the yellow t-handle on the Transcal station is aligned to 'FILL'.
3. Add approximately 500 L of clean water to the main spray tank.
4. Ensure that the red handle on the pump 3-way valve is pointing towards the suction hose coming from the main tank sump. Close all ball valves and set pressure to 110 PSI.
5. OPEN the agitator and venturi valves on the pressure delivery station.
6. CLOSE the bypass and induction hopper valves on the pressure delivery station.
7. OPEN the chemical probe valve at the Transcal station.
8. Operate the pump at the lowest speed necessary to generate 85 PSI delivery pressure (as displayed on the manifold pressure gauge). Do not run faster than 540 RPM. The higher the pump delivery pressure, the greater the venturi suction and the quicker the probe will transfer the chemical. The delivery pressure should not exceed 110 PSI as determined by the pressure relief valve setting.
9. Place the probe in the chemical drum and open the valve on the chemical probe or connect the Micromatic fitting to the outlet on the envirodrum and push the handle down so that it locks into position and opens the valve on the envirodrum.
10. The chemical should now be transferring into the Transcal tank.
11. When the required amount of chemical has been transferred, CLOSE the valve on the chemical probe. Remove it from the chemical drum and then OPEN the valve on the chemical probe again. This will drain residual chemical from hose.

If chemical has been transferred from an envirodrum, push the handle on the Micromatic coupling down slightly and then up. This will make the handle lift up and close the valve on the envirodrum. This should be done during successive fills into the Transcal tank.

When finished transferring chemical, turn the fitting in order to release it from the envirodrum.

What to do if the Transcal tank is overfilled

CAUTION: Ensure that the appropriate protective clothing is worn, as per the chemical label.

In the event of over-filling the Transcal tank, a small piece of supplied black 25 mm hose can be fitted to the ball valve on the bottom of the Transcal to drain away any excess chemical. To perform this you:

1. Turn the Transcal t-handle on the Transcal station to OFF.
2. Close the venturi valve on the EZ control pressure delivery station.
3. With the Transcal t-handle on the Transcal station to OFF, and wearing the appropriate safety clothing, undo the cam lever fittings on the ball valve on the bottom of the Transcal station and remove the black 25 mm hose. This is behind the Transcal station cover and can be accessed from underneath.
4. Attach the short length of black drain hose via the cam lever connection.
5. Place an appropriate container under the drain hose.
6. Turn the t-handle on the Transcal station to 'EMPTY'.
7. After draining the required amount of chemical, remove the drain hose, replace the vacuum supply hose and resume operating the Transcal. The raw chemical should be returned to its original container.

Continued over page

Transcal

Transferring chemical from the Transcal tank to the main tank

Once the required amount of chemical is in the Transcal tank, transfer it into the sprayer tank:

1. Ensure that the venturi valve on the pressure delivery station is ON.
2. The Transcal tank needs to be vented when emptying. Remove the chemical probe from the container and open the valve on the chemical probe, or open the Micromatic fitting.
3. Turn the 3 way ball valve on the Transcal to 'EMPTY'.
4. The chemical should now transfer into the main spray tank.

When finished:

1. The Transcal tank and probe or Micromatic coupler should be thoroughly rinsed (see 'Rinsing' section).
2. Turn the t-handle on the Transcal station OFF.
3. Turn the valve on the probe OFF.
4. Turn the venturi valve OFF.
5. Turn the bypass valve ON.
6. Ensure that the agitator valve is ON.
7. Keep the agitator valve ON until spraying begins.
8. Disconnect the probe or envirodrum line and replace the cam plug in the cam lever fitting.

Transferring chemical without measuring

The chemical can be transferred from the chemical container into the main spray tank (bypassing the Transcal tank) without the chemical being measured (i.e. by emptying full containers). This will reduce the time taken to transfer the chemical.

1. Release the cam lever fitting from the rear of the Transcal station and connect either the probe or the envirodrum line.
2. Place the probe in the chemical drum and open the ball valve on the chemical probe, or connect to the envirodrum and engage the Micromatic handle.

3. Turn the venturi valve on the pressure delivery station ON 85 PSI (see previous instructions).
4. The chemical will now transfer from the chemical drum into the main sprayer, bypassing the Transcal.
5. When the required amount of chemical has been transferred, close the ball valve on the chemical probe and remove it from the chemical drum or release the Micromatic fitting.
6. When finished, the probe or Micromatic coupler should be thoroughly rinsed (see 'Rinsing' section).
7. Turn the venturi valve OFF.
8. Turn the bypass valve ON.
9. Ensure that the agitator valve is ON. The sprayer agitator should be maintained until spraying begins.
10. Disconnect the probe or envirodrum line from the sprayer and re-attach black suction hose to the rear of Transcal station.

Continued over page

Transcal

Rinsing

CHEMICAL PROBE LINE RINSE PROCEDURE

1. Fill a suitable container with fresh water (and any applicable decontaminating agent), at least 50 litres of fresh water should be sucked through for sufficient cleaning.
2. Remove the cam lever plug and connect the chemical probe line to the cam lever socket at the Transcal station.
3. Turn Chemical Probe valve to ON.
4. Place the probe into the container with fresh water and open the valve on the chemical probe.
5. Turn the yellow t-handle on the Transcal station to 'EMPTY'.
6. Operate the Transcal venturi around 85 PSI.
7. The fresh water should now transfer to the Transcal tank and then into the main spray tank cleaning the lines from the chemical probe to the Transcal tank and to the main spray tank.

When finished:

- Turn the valve on the chemical probe line OFF.
- Turn the chemical probe valve OFF.
- Turn the yellow t-handle OFF.
- Turn the venturi valve OFF.
- Ensure that the agitator valve is ON.

Disconnect the line from the Transcal tank to the probe from the cam lever fitting and replace the cam plug.

MICROMATIC LINE RINSE PROCEDURE

1. Connect the Micromatic coupler to the Micromatic rinsing socket.
2. Connect the envirodrum suction line to the cam lever socket on the sprayer.
3. Turn Chemical Probe valve to ON.
4. Open the 'Envirodrum Coupling Rinse' valve on the external water delivery station so that the fresh water cleans both the Micromatic coupler and the line to the Transcal tank.
5. Turn the venturi ON at 85 PSI.

6. The fresh water will now rinse through the Micromatic fittings to the Transcal tank and then into the main spray tank.
7. When there has been sufficient cleaning with fresh water (at least 5 minutes of cleaning), close the Envirodrum Coupling Rinse valve.

When finished:

- Turn the chemical probe valve OFF.
- Turn the yellow t-handle OFF.
- Turn the venturi valve OFF.
- Ensure that the agitator valve is ON.

TRANSCAL TANK RINSE PROCEDURE

1. Keep both the sprayer pump and Transcal venturi system operating at 85 PSI.
2. Ensure that the tank is vented by turning the yellow t-handle on the Transcal station to 'EMPTY'.
3. Turn the 'Transcal Flush' valve on the external water delivery station ON.
4. The tank and sight tube should be rinsed and the rinsate transferred to the main spray tank.
5. Rinse the Transcal tank for as long as recommended on the chemical label, or at least two minutes.
6. Close the 'Transcal Flush' valve when tank is sufficiently rinsed and the rinsate should all have been transferred to the main spray tank.

TANK VENTING PROCEDURE

1. Turn off venturi.
2. Open probe ball valve.
3. Open Transcal ball valve to empty Transcal.
4. Vent for 30 seconds then close.

Foam Marker

Operation

Open the water valve 6 turns and open the concentrate valve in quarter turn intervals up to 2 turns until the correct foam consistency is reached. Then, open the water valve to a total of 12 turns and open the concentrate valve up to a total of 4 turns. Allow up to 5 minutes for each needle adjustment to take effect.

To successfully use the Exacta foam marking system, it is essential to observe the following points:

1. Make sure that initially all ball valves on the external water delivery station are turned OFF.
2. If filling of the main spray tank is not required at the same time, turn the red handle on the fill ball valve OFF.
3. Connect the fresh water fill hose to the quick-fill coupling.
4. Operate the fresh water pumping system (make sure pressure does not exceed 200 kPa).
5. Take the lid off the foam marker water tank.
6. OPEN the 'foam marker fill' valve. Fill the Exacta foam water tank with only clean soft water.
7. Continue to bottom-fill the foam tank until the desired amount has been transferred.
8. When the desired amount of water has been transferred to the foam tank, turn the 'foam marker fill' valve OFF.
9. Re-fit the lid to the foam marker water tank.
10. Turn the fresh water pumping system off.
11. Fill the concentrate tank with only Goldacres foam concentrate.
12. All adjustments of the control valve should be within plus or minus ½ a turn or similar.
13. Always allow sufficient time for the altered foam to come out of the accumulator.
14. If the foam is too runny, close the water valve slightly, if the foam is stiff and has air holes, open the water valve slightly. Loose foam is desirable when spraying in crops where the foam needs to sit on top of the crop in order to be visible. Tight foam is desirable when the foam needs to be visible for an extended period of time and when

the spraying conditions are relatively hot and windy.

15. Regularly inspect the foam marker lines, to ensure they are free of foreign matter.
16. Periodically remove and clean the water filter.
The foam marker filter is located underneath the foam marker tank. To remove the filter, ensure the appropriate protective clothing is being worn. Close the foam tank ball valve, loosen the brass screen, remove the filter and clean.
17. Periodically check the condition of the one-way valve in the compressor/diverter unit.

WARNING: Ensure that the foam marker water tank lid is screwed on loosely to prevent pressure build up in the tank.

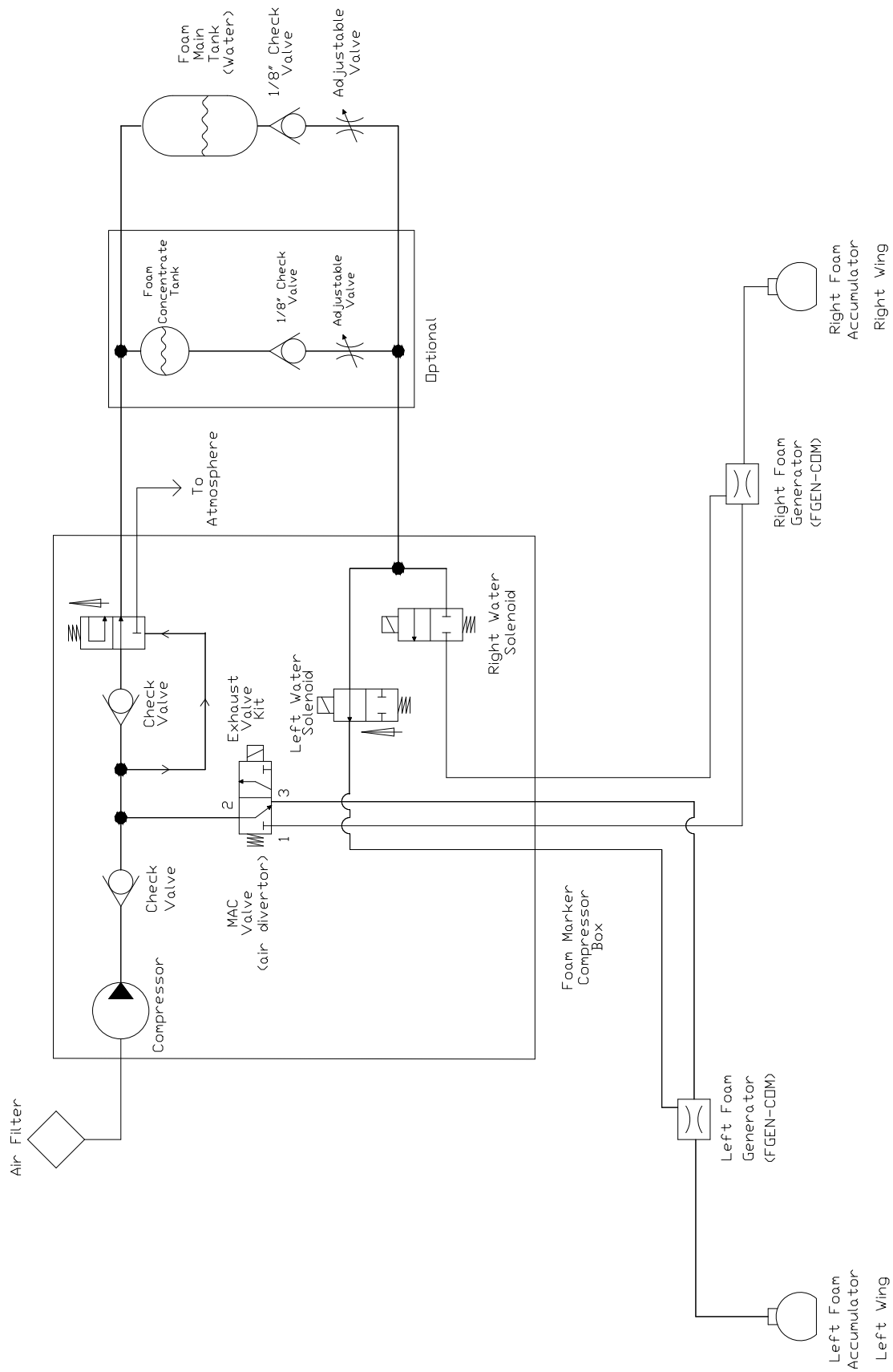
NOTE: If either the water tank or the foam concentrate tank empties, it's possible that flow from the other tank (foam water or foam concentrate) can siphon into the empty tank. To prevent this, as soon as either the foam water tank or foam concentrate tank empties, shut the ball valve at the bottom of both tanks. Re-fill the tanks prior to the next spraying operation. Regularly check valves.

Bleeding the concentrate line when the foam concentrate tank empties:

If the foam concentrate tank empties, it will take a few minutes for the concentrate to feed through the lines to the compressor/diverter unit. To reduce this time, the concentrate can be bled to minimize water wastage.

1. Close the concentrate needle valve ½ turn at a time and record the number of turns until the needle valve is closed.
2. Open the needle valve several turns more than the previous setting.
3. When the concentrate comes through, fully close the concentrate needle valve and then re-open the valve to the setting recorded from step 1.

Foam Marker - Schematic



Rowcrop Turnable Hitch

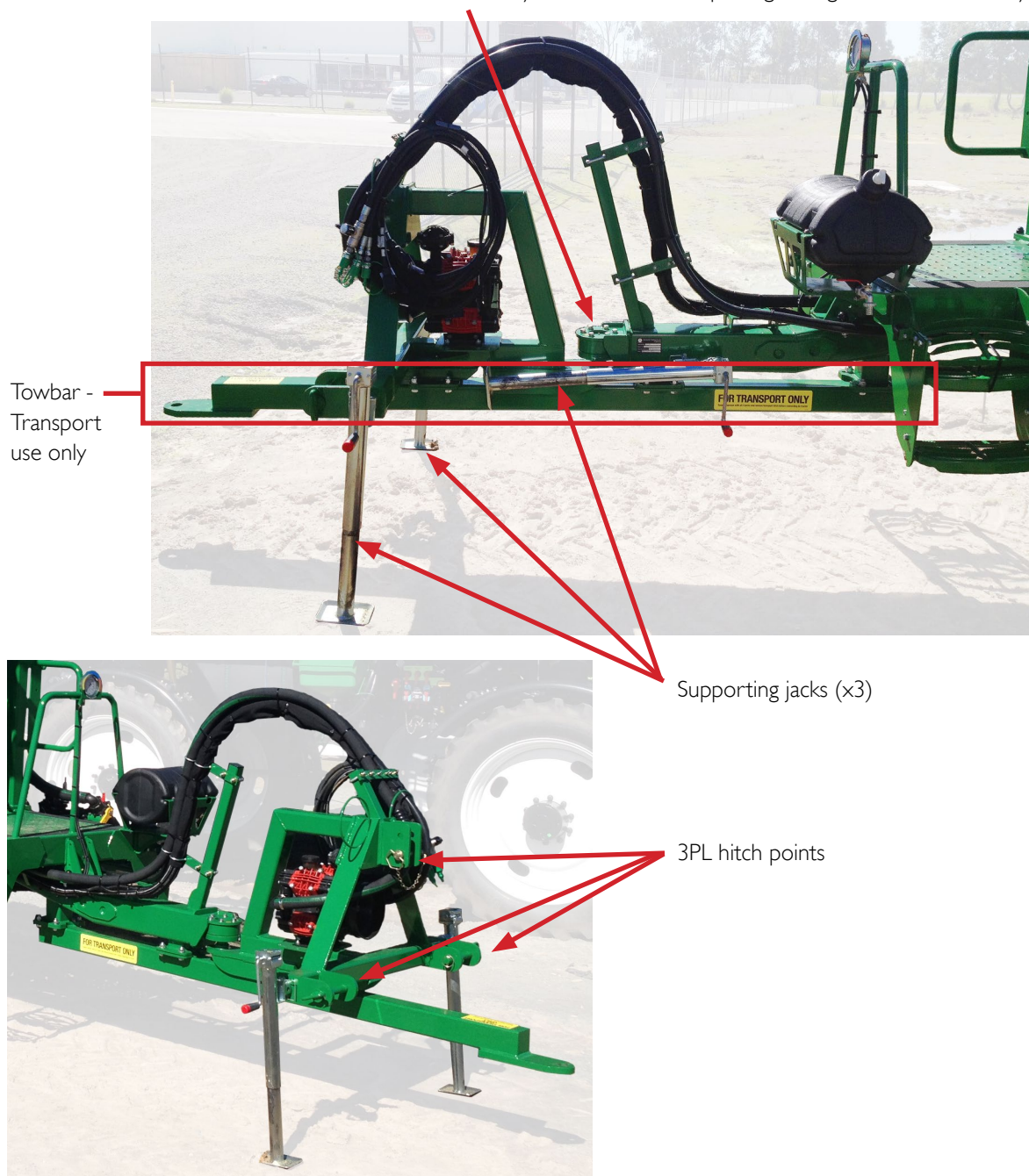
The Rowcrop Compact can be fitted with an optional articulating turnable hitch assembly that allows much greater turn angles at the end of a row.

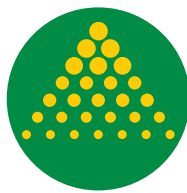
The hitch shown in the picture below is fitted with the transport towbar that locks the turnable hitch for road transport, this towbar should be removed when the sprayer is in use and the hitch must be coupled via the tractor three point linkage arms.

When connecting or disconnecting the sprayer with the transport towbar fitted, the single chassis jack can be used to support the front of the unit. Never disconnect the sprayer with the tank full of water.

When connecting or disconnecting the unit from the tractor three point linkage arms you must use the three jacks to support the sprayer chassis and the turnable hitch.

The turnable hitch features a swivel assembly. **IMPORTANT:** Requires greasing before use each day.





GOLDACRES

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